

FLOWTRON® UNIVERSAL  
Service Manual

ARJOHUNTLIGH





## Service Bulletins Incorporated



## CONTENTS

### CHAPTER 1

<b>Introduction . . . . .</b>	<b>1</b>
About This Manual . . . . .	1
Warnings, Cautions and Notes . . . . .	1
General Description . . . . .	1
Technical Description . . . . .	3
Pressure Transducer Calibration . . . . .	3
Alarms . . . . .	3
Battery on the Control PCB Assembly (if fitted) . . . . .	3
Schematics . . . . .	3
System Operation . . . . .	4

### CHAPTER 2

<b>Troubleshooting . . . . .</b>	<b>1</b>
Troubleshooting Table . . . . .	1
Alarm Cancel . . . . .	1

### CHAPTER 3

<b>Maintenance . . . . .</b>	<b>1</b>
Service . . . . .	1
Cleaning Instructions . . . . .	2
Maintenance Checks . . . . .	3

### CHAPTER 4

<b>Testing . . . . .</b>	<b>1</b>
Initialising the Pump . . . . .	1
Garment Recognition Test . . . . .	1
Checking the Basic Pump Operation . . . . .	3
Location of the Soft-Function Buttons on the Pump Membrane Label . . . . .	5
Using the Buttons below the Service Screen on the LCD Display . . . . .	5
Preparation of the Calibration Test Equipment . . . . .	6
Checking the Calibration of the Pressure Transducer . . . . .	7
Re-calibrating the Pressure Transducer . . . . .	10
Recalibrating the Pump Hose Set Assemblies . . . . .	12
Electrical Safety Testing . . . . .	14
Electrical Safety Checks . . . . .	14
Earth/Ground Continuity Test . . . . .	14

Insulation Resistance Test . . . . .	15
Dielectric Strength Test (Flash Test) . . . . .	15
Leakage Earth/Ground Current Test (USA) . . . . .	15

**CHAPTER 5**

<b>Pump Repair . . . . .</b>	<b>1</b>
General . . . . .	1
Pump Labels . . . . .	3
Removing the Case IEC Cover . . . . .	6
Installing the Case IEC Cover . . . . .	6
Replacing the Inlet Filter Felt . . . . .	7
Removing the Mains/Power Cordset . . . . .	7
Installing the Mains/Power Cordset . . . . .	7
Removing the Hose Set Assembly . . . . .	9
Installing the Hose Set Assembly . . . . .	10
Removing the Rear Case from the Pump . . . . .	13
Installing the Rear Case onto the Pump . . . . .	13
Removing the Handle and Hook Assembly . . . . .	13
Installing the Handle and Hook Assembly . . . . .	13
Separating the Top Case Assembly from the Front Case . . . . .	15
Installing the Top Case Assembly onto the Front Case . . . . .	16
Replacing the Mains/Power Fuses on the Power Supply PCB Assembly . . . . .	17
Replacing the Air Inlet Filter on the Compressor Assembly . . . . .	17
Removing the Motor and Manifold Assembly . . . . .	19
Repairing the Motor and Manifold Assembly . . . . .	19
Installing the Motor and Manifold Assembly . . . . .	25
Including a Longer Transducer Tube on the Motor and Manifold Assembly . . . . .	25
PCB Part Numbers . . . . .	27
Interchangeability of PCBs . . . . .	27
Removing the Control Printed Circuit Board (PCB) Assembly . . . . .	29
Installing the Control Printed Circuit Board (PCB) Assembly . . . . .	29
Removing the Power Supply PCB (Printed Circuit Board) Assembly . . . . .	31
Installing the Power Supply PCB (Printed Circuit Board) Assembly . . . . .	31
Removing the LCD Sub-Assembly . . . . .	33
Removing the Control PCB Assembly from the Top Case Assembly . . . . .	33
Removing the LCD Sub-Assembly from the Control PCB Assembly . . . . .	33
Installing the LCD Sub-Assembly . . . . .	34
Installing the LCD Sub-Assembly onto the Control PCB Assembly . . . . .	34
Installing the Control PCB Assembly into the Top Case Assembly . . . . .	35

Replacing the Membrane Label by removing the Control PCB Ass'y from the Top Case Ass'y . . . . .	37
Replacing the Membrane Label without removing the Control PCB Assembly . . . . .	39
Removing the Run Button . . . . .	40
Installing the Run Button . . . . .	40
Replacing the Top Case Assembly . . . . .	40
Replacing the Battery on the Control PCB Assembly (if fitted) . . . . .	41
Removing the Compressor Assembly and Mounting Bracket . . . . .	43
Installing the Compressor Assembly and Mounting Bracket . . . . .	43
Removing the Compressor Assembly from the Mounting Bracket . . . . .	45
Installing the Compressor Assembly onto the Mounting Bracket . . . . .	45
Replacing the Rear Case. . . . .	47
Replacing the Front Case . . . . .	49

## CHAPTER 6

<b>Updating the software . . . . .</b>	<b>1</b>
Introduction . . . . .	1
Installing the Communicator Software . . . . .	2
Connecting the Pump to a Laptop / Desktop PC. . . . .	9
Launching the Communicator Software . . . . .	11
Executing Commands on the Command Menu . . . . .	12
Communication Error when Executing Commands . . . . .	13
Closing the Communicator Software . . . . .	13
Initialising the Pump . . . . .	15
Checking the Version of the Pump Software. . . . .	17
Downloading the V3.01 Software Files to the Pump . . . . .	17

## CHAPTER 7

<b>Technical Specification . . . . .</b>	<b>1</b>
Pump . . . . .	1
Accessories . . . . .	2

## CHAPTER 8

<b>Parts List. . . . .</b>	<b>1</b>
General. . . . .	1
Pump Parts List . . . . .	1

## CHAPTER 9

<b>Service Contact Details. . . . .</b>	<b>1</b>
---	----------



# CHAPTER 1

## INTRODUCTION

### 1 About This Manual

ArjoHuntleigh strongly recommend that their equipment is only serviced by trained personnel and provide courses for customers who wish to become licensed to service their own equipment. In no event will ArjoHuntleigh be responsible for any service performed by customers or third parties.

This manual contains information on maintenance, servicing, repair, troubleshooting and testing for the **Flowtron® Universal** pump. Read and understand this manual before attempting to service or repair the equipment.

#### Numbering and Cross-Referencing in this Manual

For all chapters in this manual:

- Page, section and paragraph numbering re-start at “1”.
- Figure and table numbering continue from the previous chapter.
- Cross-references which include a chapter number (and/or chapter title) refer to text in a different chapter. Cross-references which do NOT include any chapter number (or chapter title) refer to text within the same chapter.

#### Warnings, Cautions and Notes

**WARNINGS** given in this manual identify possible hazards in procedures or conditions which, if not correctly followed, could result in death, injury or other serious adverse reactions.

**CAUTIONS** given in this manual identify possible hazards in procedures or conditions which, if not correctly followed, could result in equipment failure or damage.

**Notes** given in this manual are used to explain or amplify a procedure or condition.

**WARNING: BEFORE PERFORMING ANY SERVICE OR MAINTENANCE PROCEDURES,  
ENSURE THAT THE EQUIPMENT HAS BEEN ADEQUATELY  
DECONTAMINATED.**

**WARNING: BEFORE DISMANTLING THE PUMP, ENSURE UNIT HAS BEEN ISOLATED  
FROM THE POWER SUPPLY BY REMOVING THE CORD PLUG FROM THE  
WALL OUTLET.**

**WARNING: VOLTAGES IN EXCESS OF 30 VOLTS RMS OR 50 VOLTS DC CAN, IN  
CERTAIN CIRCUMSTANCES, BE LETHAL. WHEN WORKING ON  
EQUIPMENT REQUIRING EXPOSURE TO LIVE/HOT, UNPROTECTED  
CONDUCTORS WHERE SUCH VOLTAGES ARE PRESENT, EXTREME CARE  
MUST BE EXERCISED.**

### 2 General Description

The **Flowtron Universal** system is a non-invasive external intermittent pneumatic compression system for reducing the incidence of deep vein thrombosis (DVT).

The application of external intermittent pneumatic compression has two effects:

- Augments venous blood flow velocity, thereby reducing stasis.
- Enhances fibrinolytic activity to reduce the risk of early clot formation.

The system comprises a pump that can be used in conjunction with a pair of ArjoHuntleigh single-patient-use compression garments.

The pump provides intermittent cycles of compressed air to the two connected compression garments, which are inflated alternately. The pump can be used with a number of different ArjoHuntleigh single-patient-use compression garments, including:

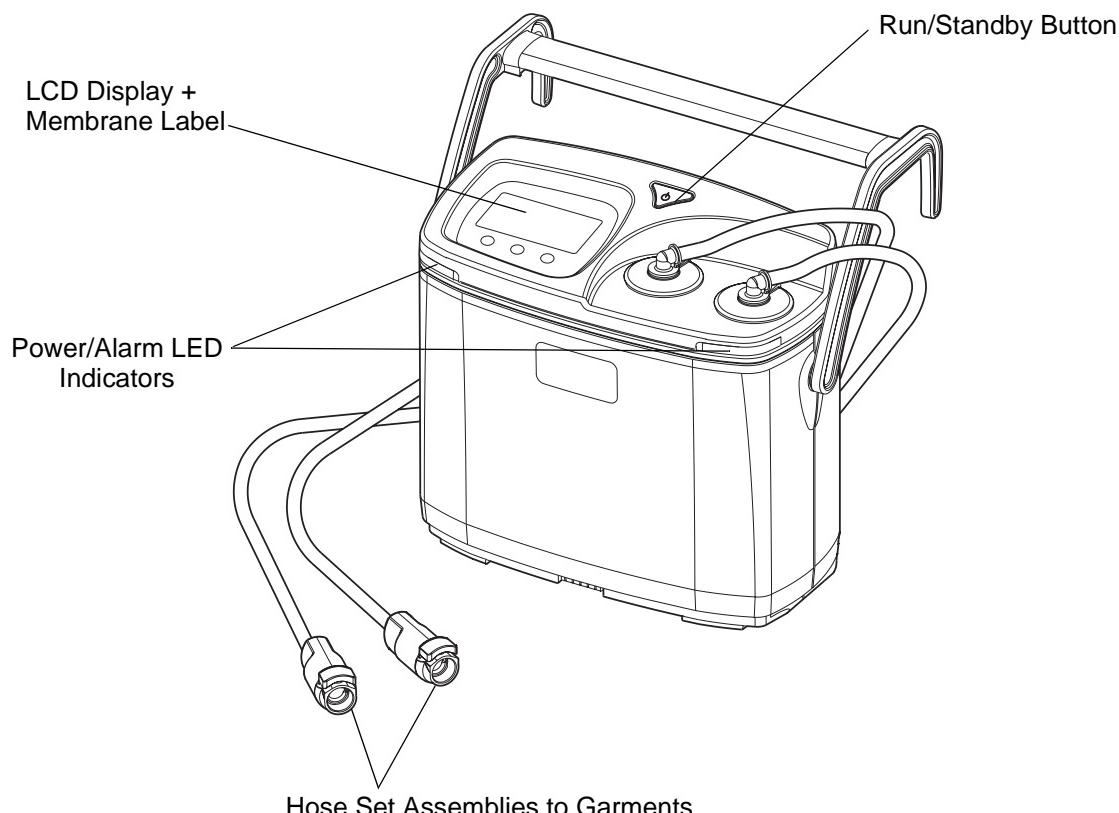
- Foot garments, e.g. FG100-200.
- Single-chamber calf and thigh/calf garments, e.g. DVT10-40, 60.

The pump automatically adjusts the correct therapy profile for the garment type being inflated.

An optional battery pack is available which allows the pump to be used independently of the mains/power supply. The battery pack slides onto the base of the pump, and recharges itself when the pump is operating from the mains/power supply.

The pump has the following controls (Refer to Figure 1):

- A **Run/Standy** push-button. This is used to start and stop the therapy applied to the patient.
- An illuminated graphic LCD display. This indicates:
  - The type of garment(s) connected.
  - The pressure delivered to each garment.
  - Alarm indications.
- A membrane label which contains the following four soft-function buttons:
  - A three-button keypad below the LCD display. These are used during the normal operation of the pump.
  - A single “hidden” button above the LCD display. This is used during service and repair operations only.
- Red and green LED indicators on the front of the pump to show alarm and run status.
- Automatic detection of the connected garment type.



**Figure 1 - Flowtron Universal Pump**

### 3 Technical Description

The pump consists of an electronically controlled air compressor with associated air routing and alarm facilities. The operation of all the pump features is driven by microcontroller software.

The key parts of the pump are as follows:

- Compressor. This provides a flow of air to the pneumatic system, thus allowing inflation of the garments. The output of the compressor is fed to the motor and manifold assembly.
- Motor and Manifold Assembly. This includes a rotary valve which routes the air pressure to the garments. The rotary valve also makes sure that as one garment is being inflated, the other garment is vented to the atmosphere.
- Pressure Transducer. This provides the monitoring system with the means of accurately measuring the pressure fed to each garment.
- Control Printed Circuit Board (PCB). This PCB controls the compressor, the motor and manifold assembly, and the illuminated graphic LCD display panel. It also performs a continuous check of the operation and performance of the pneumatic circuit. In the event of a detected fault, the electronic monitoring system generates both visual and audible alarms.
- Power Supply Printed Circuit Board (PCB). In addition to generating the DC voltages for use in the pump, the PCB provides interfaces to the compressor and the optional battery pack.
- Automatic Garment Recognition Facilities. The connector on the end of each pump hose set contains a sense coil which is connected to the control PCB, and is used to automatically recognise the type of garment fitted to the connector (foot garment, or single chamber calf garment).

#### Pressure Transducer Calibration

The pump utilizes a precise and accurate pressure measurement and control system, which is not expected to require re-calibration until after several years of continuous use. The measurement system automatically handles any adverse effects due to drift or temperature change and should not require any user intervention.

The pump is factory-calibrated, and should not normally require field re-calibration.

However, the pressure shown on the LCD display should be verified for accuracy during each routine maintenance.

#### Alarms

The pump has both audible and visual alarms. If a problem occurs, the system will detect the fault and flash a message on the LCD display. If the same fault continues for 10 successive inflation cycles (which will be between 5 and 12 minutes depending on the garment types connected to the pump), the audible alarm sounds, the red alarm LEDs flash and a description of the fault condition is indicated on the LCD display. If the fault condition is unaltered, the audible alarm will increase in pitch until the fault is corrected and/or the system is reset.

**Note:** *If a Pump Fault is detected, the pump will alarm immediately.*

#### Battery on the Control PCB Assembly (if fitted)

The battery on the control PCB assembly provides power for the real time clock. The battery should not require replacement until after several years of continuous use. If the battery has to be replaced, then it must be replaced in less than 20 seconds, or else the real time clock will lose its time and date settings. If the time and date settings are lost, they have to be reloaded from a PC-based service tool, so the procedure should only be carried out in a ArjoHuntleigh service environment.

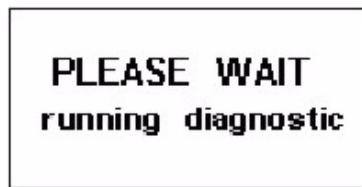
#### Schematics

Refer to Figure 8 for the Pneumatic/Control Schematic of the pump.

Refer to Figure 9 for the Electrical Schematic of the pump.

## 4 System Operation

- 4.1 Plug the pump into an electrical outlet, and switch on.
- 4.2 The pump will first go through a self-test routine (Refer to Figure 2).



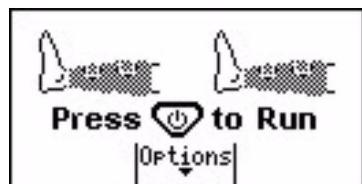
**Figure 2 - LCD Display - Running Diagnostic**

- 4.3 At the end of the self-test routine, the pump will "beep" and go into **Standby** mode, where it will remain until required for use (Refer to Figure 3).



**Figure 3 - LCD Display - Standby**

- 4.4 Connect the garments to the pump hose set assemblies and make sure the connectors click into place.
- 4.5 Check that the connection and garment type are confirmed correctly on the display. Figure 4 shows two single-chamber calf garments connected to the pump.



**Figure 4 - LCD Display - Garments Connected**

- 4.6 Typical garment options and default therapy parameters are detailed in Table 1.

**Table 1 - Garment Options and Default Therapy Parameters**

Garment Type and LCD Display Graphic	Inflation Pressure (mmHg)	Inflation Hold (seconds)	Cycle (seconds)
Foot	130	3	30
Single-chamber, Calf and Thigh/Calf	40	12.5	60

- 4.7 To start the therapy, press the green **Run** button  on the top of the pump, and keep it depressed until the pump “beeps”. The green LEDs on the front of the pump will illuminate and therapy will begin. Figure 5 shows the pump running, and the left calf garment inflated to 40 mmHg.

**Note:** The green LEDs do not illuminate when running from the battery pack.



Figure 5 - LCD Display - Therapy Started

- 4.8 To stop the therapy, press the green **Run** button  a second time, and keep it depressed until the pump “beeps”. The green LEDs on the front of the pump will extinguish and therapy will stop.  
 4.9 To connect only one garment to the pump:

- 4.9.1 When the pump is in standby, connect one garment to either hose set assembly.  
 4.9.2 The LCD display will confirm that only one garment is connected (Refer to Figure 6).

**Note:** If a garment is disconnected while the pump is running, the system will alarm **Lo**. If the single garment option is still required, simply press the **Run** button  to reset the system and press the **Run** button  again to restart therapy.

**Note:** If at any time a second garment is connected while the pump is running, the pump will automatically change to two garment operation.

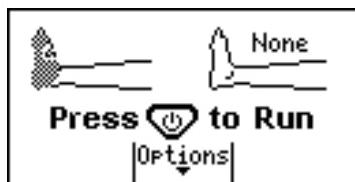


Figure 6 - LCD Display - Single Garment Connected

- 4.10 To connect different garments on each limb:

- 4.10.1 Simply connect the garments to either hose set assembly, and the correct therapy cycle will be administered for each garment.  
 4.10.2 Check on the display panel to confirm the garment types connected (Refer to Figure 7).

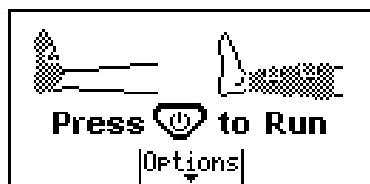
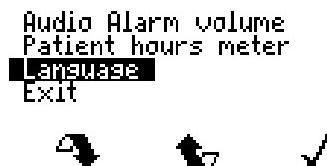


Figure 7 - LCD Display - Different Garments Connected

4.11 To change the language displayed on the pump:

4.11.1 Press the function button adjacent to "Options"

4.11.2 Use the arrow buttons to highlight the "Language" change option.



4.11.3 Press the button to continue.

4.11.4 Use the arrow buttons to scroll through the available languages.

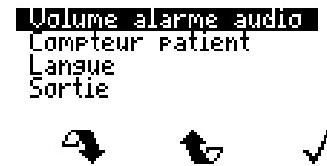


4.11.5 Highlight the desired language and press the button to select.

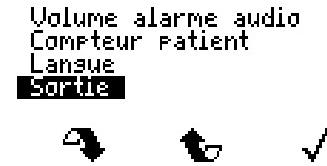
4.11.6 Press the button again to confirm the selection.



4.11.7 Use the arrow buttons to highlight "Exit" (in the new language):

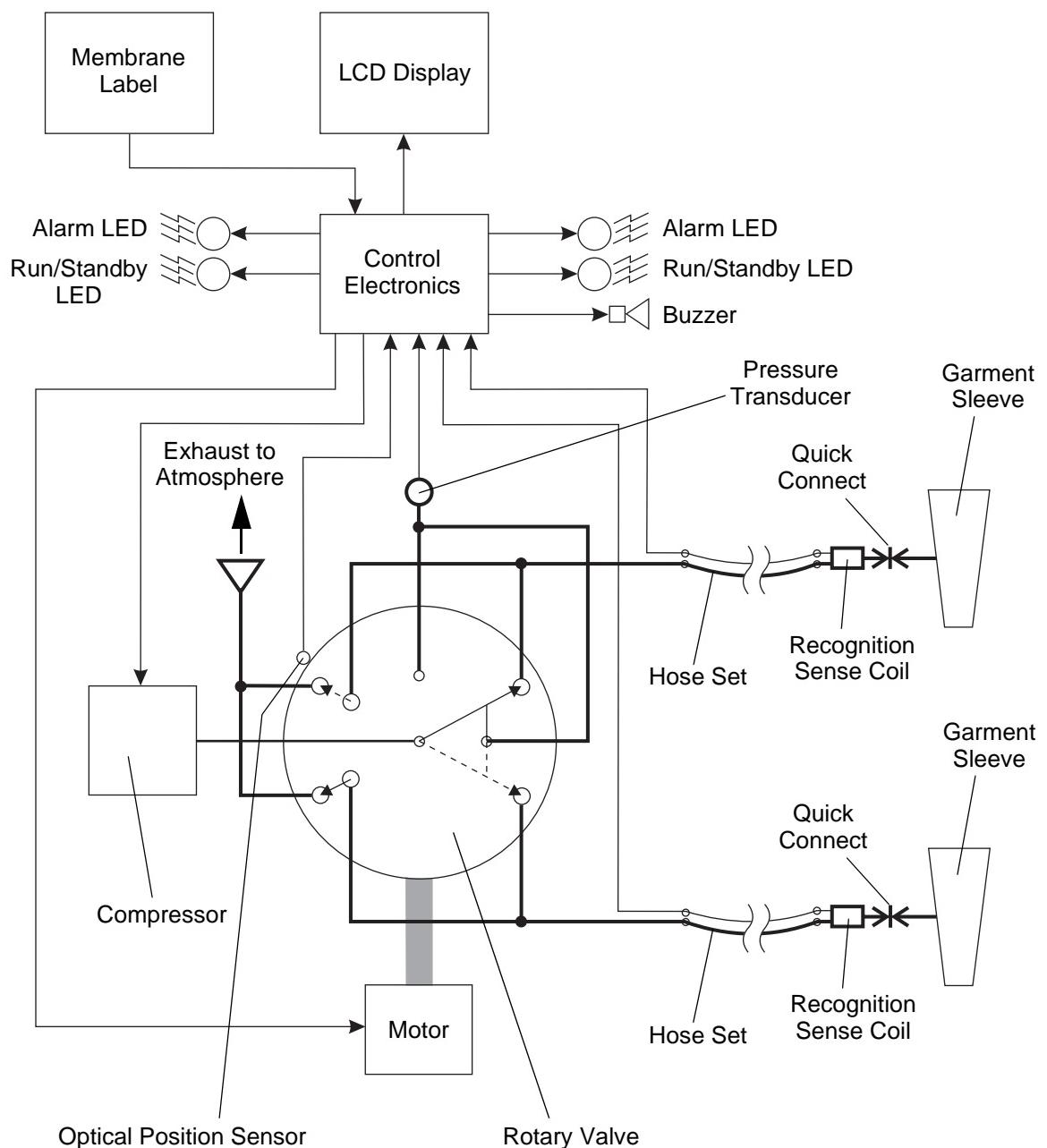


4.11.8 Press the button to continue.



4.11.9 The screen will now display the main menu in the new language:



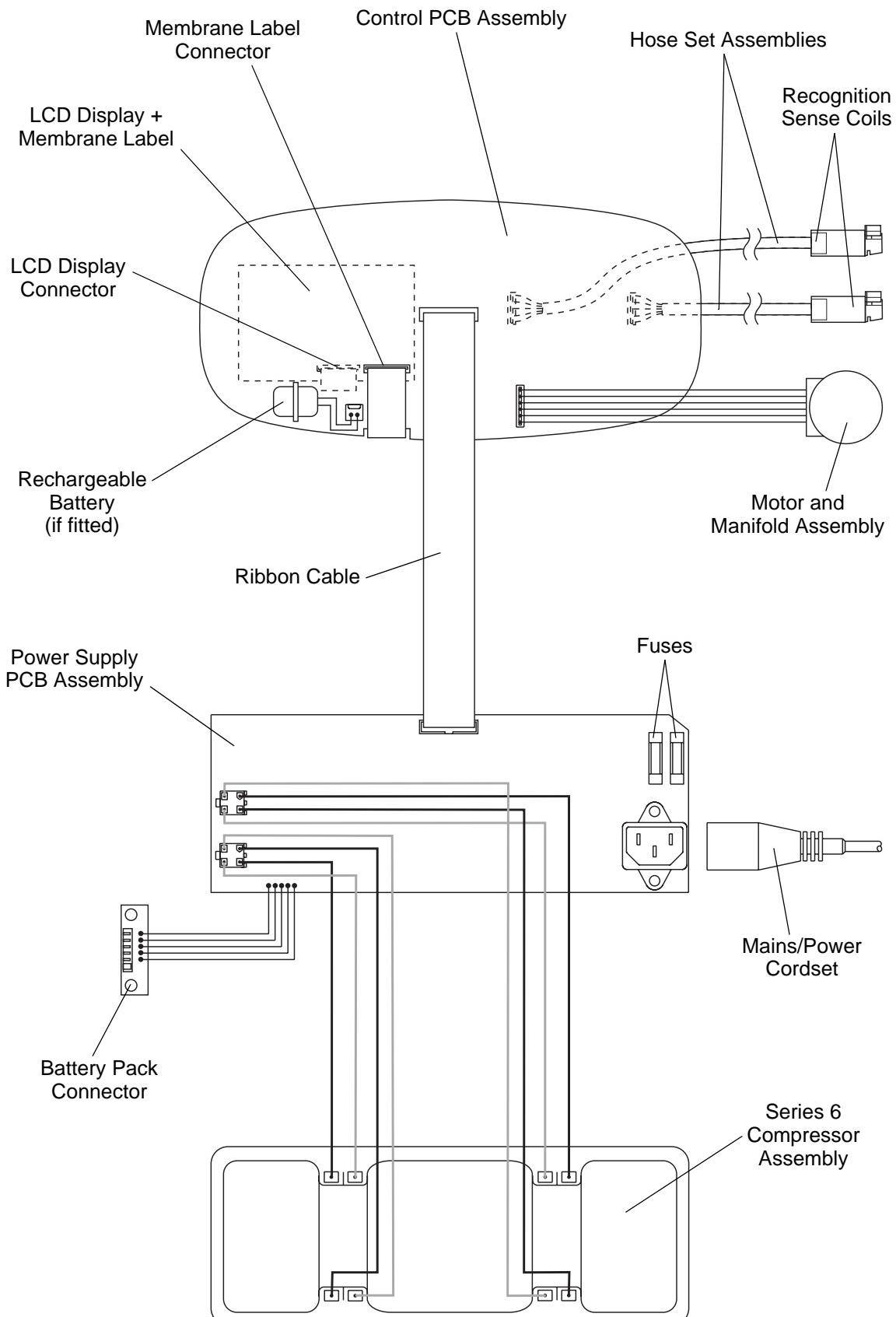


— Electrical Connections

— Pneumatic Connections

Mechanical Link

**Figure 8 - Pneumatic/Control Schematic**



**Figure 9 - Electrical Schematic**

## CHAPTER 2

# TROUBLESHOOTING

### 1 Troubleshooting Table

The Flowtron Universal pump features an audible and visual alarm. If a problem occurs, the system will sense the fault and briefly flash a message on the LCD display on the top of the pump.

If the same fault continues for 10 successive inflations (up to 10 minutes), the audible alarm will sound, the red alarm lights on the front of the pump flash and a message will appear on the LCD display until corrective action is completed. The exception to this is a **Pump Fault** alarm, which will alarm immediately.

#### Alarm Cancel

After a fault has been corrected, the alarm can be cancelled by either of the following two methods:

- Press the **Run** button  on the pump twice, or until the green lights are lit and the pump is running.
- With the exception of a **Pump Fault** alarm, correct the fault and allow the pump to run until it senses a normal inflation. It will then reset itself.

Page 2, Table 2 contains fault symptoms, their possible causes and suggests steps to rectify the problem. Where possible, reference is made to the relevant repair chapter.

**Table 2 - Troubleshooting Table**

Fault	Possible Cause	Remedy
<b>“LO” (Low Pressure Alarm)</b>	<b>Garment</b>	Hose disconnected at garment.  Loose fitting garment.  Garment leak.
	<b>Pump</b>	Kinked tube to the transducer on the control PCB.  Damaged/disconnected internal tube.  Damaged hose set assembly.  Blocked air filters.
		Check the hose connections at the garment end.  Rewrap snugly.  Check garment and replace if necessary.
		Check tube for kinks or obstructions.  Check internal tubes and replace if necessary.  Check hose set assemblies, and replace if necessary. (Chapter 5, Page 9, Section 8) (Chapter 5, Page 10, Section 9)
		Replace inlet filters on the rear case and compressor assembly. (Chapter 5, Page 7, Section 5) (Chapter 5, Page 17, Section 17)
		Replace. (Chapter 5, Page 19, Section 18) (Chapter 5, Page 25, Section 20)
		Replace. (Chapter 5, Page 45, Section 38) (Chapter 5, Page 45, Section 39)
	<b>Garment</b>	Garment hose kinked.
	<b>Pump</b>	Hose set assembly kinked.
		Check garment hose for kinks or obstructions.  Check hose set assemblies for kinks or obstructions.
<b>“Pump Fault”</b>	<b>Pump</b>	Control PCB faulty.  Power Supply PCB faulty.
		Replace. (Chapter 5, Page 27, Section 22) (Chapter 5, Page 29, Section 25)  Replace. (Chapter 5, Page 31, Section 26) (Chapter 5, Page 31, Section 27)
<b>“Pump Fault - RFID”</b>	<b>Pump</b>	Hose set electrical connections are not fitted correctly to pump.
		Check hose set assemblies, and replace if necessary. (Chapter 5, Page 9, Section 8) (Chapter 5, Page 10, Section 9)
<b>“Pump Fault - Step”</b>	<b>Pump</b>	Motor and manifold assembly failed.
		Replace. (Chapter 5, Page 19, Section 18) (Chapter 5, Page 25, Section 20)

## CHAPTER 3

### MAINTENANCE

**WARNING: BEFORE DISMANTLING THE PUMP UNIT, MAKE SURE THE UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.**

**WARNING: A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS ON THE POWER SUPPLY PCB ASSEMBLY WHEN THE CASE IS OPENED, EVEN WITH THE PUMP SWITCHED OFF.**

**CAUTION:** *Static Sensitive Devices. Electrostatic discharge can seriously damage the control and power supply PCB assemblies. This pump should only be opened by personnel trained in ESD methods and with appropriate equipment and anti-static protection.*

#### 1 Service

The pump should be serviced every 12 months.

To service the pump, do the following:

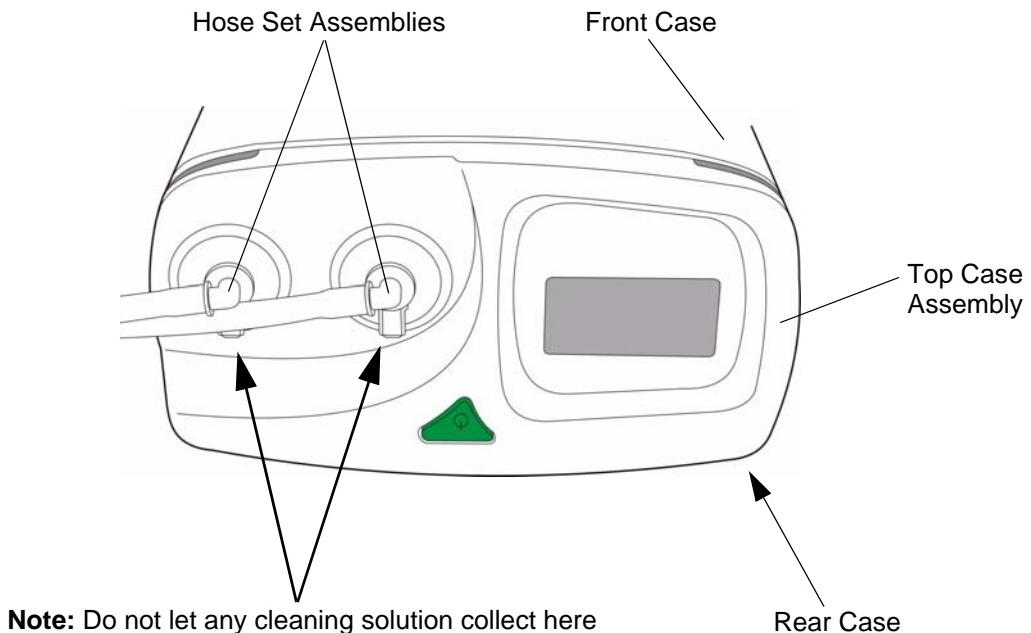
- 1.1 Carry out the maintenance checks, detailed below (Refer to Chapter 3, Page 3, Section 3).
- 1.2 Replace the inlet filter felt on the rear case (Refer to Chapter 5, Page 7, Section 5).
- 1.3 Carry out the following function tests on the pump:
  - 1.3.1 Garment recognition test, in accordance with Chapter 4, Page 1, Section 2.
  - 1.3.2 Checking the calibration of the pressure transducer, in accordance with Chapter 4, Page 7, Section 7.

**Note:** *The pump is designed to remain accurate throughout its working life. This test checks the accuracy of the pressure shown on the LCD display. The pump is factory-calibrated, and should not normally require field re-calibration.*
- 1.4 Carry out an electrical safety tests on the pump in accordance with Chapter 4, Page 14, Section 10.

## 2 Cleaning Instructions

If the pump is to be cleaned by spraying cleaning solutions directly onto it, the following (Refer to Figure 10) instructions must be observed:

- 2.1 Lay the pump down on its rear case, so that the cleaning solution will not collect on the top cover assembly adjacent to the two hose set assemblies.
- 2.2 Use a soft cloth to remove any unwanted cleaning solution from the top cover assembly.



**Figure 10 - Top Cover Assembly and Hose Set Assemblies**

### 3 Maintenance Checks

If any parts are found to be damaged they must be replaced in accordance with Chapter 5, Pump Repair.

3.1 Visually inspect the following for damage, wear and potential faults:

- Outer casing: Check for damage and security.
- **Run button**  : Check function.
- Handle and hook assembly: Check for damage and security.
- Output hose set assemblies: Check for damage and security of pump connection.
- LCD display + membrane label: Check for damage and security to case.
- Mains/power cord: Check for damage and security of plug
- Rubber feet (8 Off): Check for security.
- Labels: Check all labels are present and legible

3.2 Remove the rear case (Refer to Chapter 5, Page 13, Section 10) and visually inspect the following for damage, wear, security and potential faults:

- Rechargeable battery on the control PCB.
- Compressor assembly.
- Compressor anti-vibration pads.
- Motor and manifold assembly.
- Control PCB and LCD display assembly.
- Power supply PCB assembly, including fuses.
- Wiring.
- Internal Tubing.
- Screws, nuts and bolts.

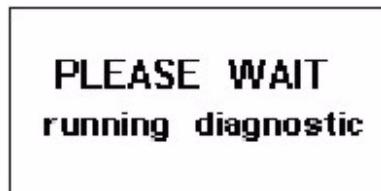


## CHAPTER 4

### TESTING

#### **1 Initialising the Pump**

- 1.1 Make sure that NO garments are connected to either pump hose set assembly.
- 1.2 Plug the pump into an electrical outlet, and switch on.
- 1.3 The pump will first go through a self-test routine (Refer to Figure 11).



**Figure 11 - LCD Display - Running Diagnostic**

- 1.4 At the end of the self-test routine, the pump will "beep" and go into **Standby** mode, where it will remain until required for use (Refer to Figure 12).



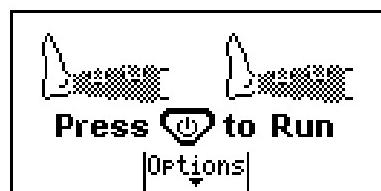
**Figure 12 - LCD Display - Standby**

#### **2 Garment Recognition Test**

- 2.1 Initialise the pump (Refer to Page 1, Section 1).
- 2.2 Connect a garment to each pump hose set assembly. Make sure the connectors click into place.
- 2.3 Make sure the connection and garment types are confirmed correctly on the display, as follows:

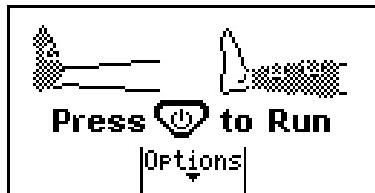
**Note:** There is a separate graphic for each hose set assembly, and each of these can be one of a number of graphics to indicate the garment type (Refer to Table 3).

- 2.3.1 Figure 13 shows two single-chamber calf or thigh/calf garments connected to the pump.



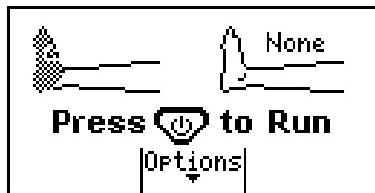
**Figure 13 - LCD Display - Two Single-Chamber Calf or Thigh/Calf Garments Connected**

- 2.3.2 Figure 14 shows a foot garment and a single-chamber calf or thigh/calf garment connected to the pump.



**Figure 14 - Foot and Single-Chamber Calf or Thigh/Calf Garments Connected**

- 2.3.3 Figure 15 shows a foot garment connected to one hose set assembly, and no garment connected to the other.



**Figure 15 - Only One Garment Connected**

- 2.3.4 If the LCD display shows either an incorrect garment graphic or a "no garment" graphic when one is connected, then carry out the procedure for recalibrating the pump for a new hose set assembly (Refer to Page 12, Section 9).

**Table 3 - Garment Options and Default Therapy Parameters**

Garment Type	LCD Display Graphic	Inflation Pressure (mmHg)	Inflation Hold (seconds)	Cycle (seconds)
Foot		130	3	30
Single-chamber, Calf and Thigh/Calf		40	12.5	60
No Garment Connected		-	-	-

### 3 Checking the Basic Pump Operation

- 3.1 Initialise the pump (Refer to Page 1, Section 1).
- 3.2 Connect a garment to each pump hose set assembly. Make sure the connection and garment types are confirmed correctly on the display (Refer to Table 3).

**Note:** Although it is preferable to connect two different garment types to test the pump, the pump can be tested with two identical garments or even just a single garment connected.

- 3.3 Press the green **Run** button  on the top of the pump to start the pump, and keep it depressed until the pump “beeps”. The green LEDs on the front of the pump will illuminate and the compressor will start. Figure 16 shows the pump running, and the left calf garment inflated to 40 mmHg.

**Note:** The green LEDs do not illuminate when operating from the battery.

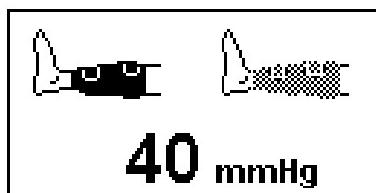


Figure 16 - LCD Display - Therapy Started

- 3.4 The pump provides intermittent cycles of compressed air to the two connected garments, which are inflated alternately. During the test, check the LCD display to make sure that:

- 3.4.1 It shows the correct type of garments connected to the pump.
- 3.4.2 The correct pressure is being applied to each garment (Refer to Table 3).

**Note:** It is only necessary to check that the pressures are approximately correct.

- 3.4.3 No fault messages appear.
- 3.5 Check that the inflation hold time and cycle time are correct (Refer to Table 3).

**Note:** It is only necessary to check that the times are approximately correct.

- 3.6 Check the **Lo** alarm on the pump as follows:

- 3.6.1 Disconnect a garment from its hose set assembly while the pump is running, and check that within one complete inflation cycle (which will be between 30 and 72 seconds depending on the garment types connected to the pump), the pump will detect the fault and flash **Lo Alarm - Garment unplugged** on the LCD display (Refer to Figure 17).

**Note:** If the garment is disconnected while it is actually being inflated, the LCD display may initially flash **Lo Alarm - Garment leak** instead, followed by **Lo Alarm - Garment unplugged**.

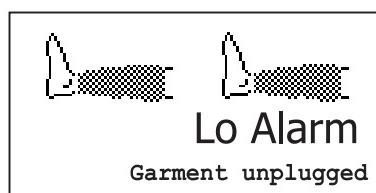
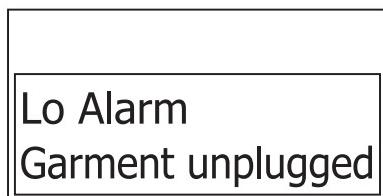


Figure 17 - LCD Display - Lo Alarm - Fault Message

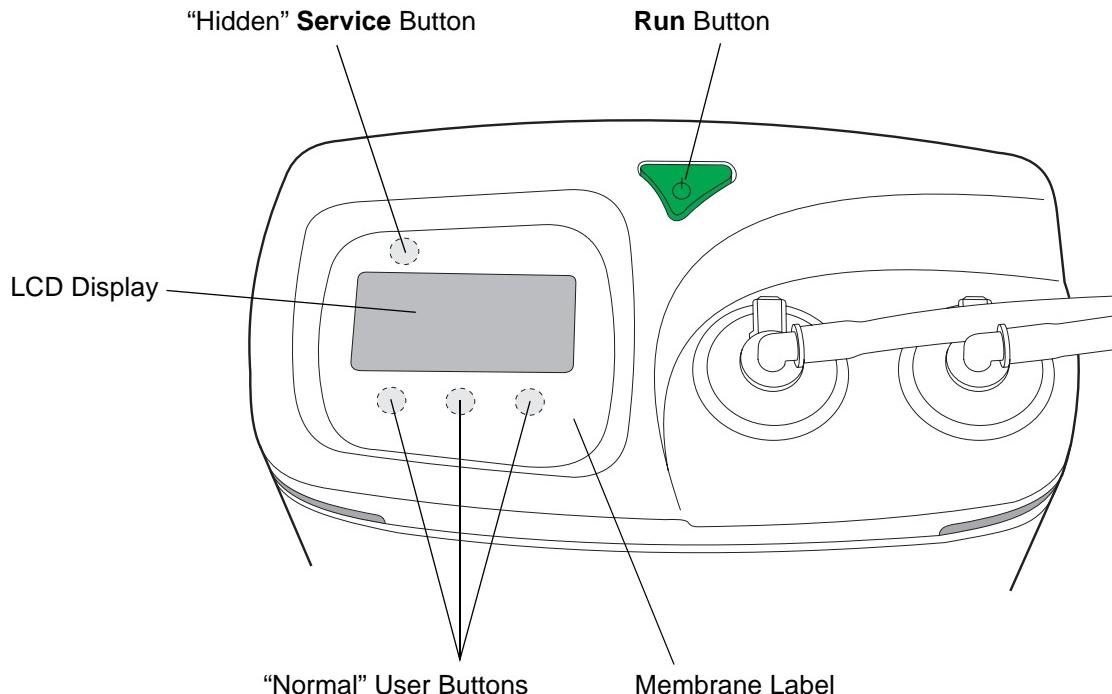
- 3.6.2 Reconnect the garment to the hose set assembly, and check that within two complete pump cycles, the pump automatically senses the garment and resumes normal operation.
- 3.6.3 Disconnect the garment again, as detailed in Para 3.6.1., and leave disconnected.
- 3.6.4 Check that after 10 successive inflation cycles (which will be between 5 and 12 minutes depending on the garment types connected to the pump), the pump will alarm as follows:
  - 3.6.4.1 The audible alarm sounds.
  - 3.6.4.2 The red alarm LEDs on the front of the pump flash.
  - 3.6.4.3 The message **Lo Alarm - Garment unplugged** is shown on the LCD display (Refer to Figure 17).



**Figure 18 - LCD Display - Lo Alarm Message**

- 3.6.5 Check that if the garment is left disconnected, the audible alarm will increase in pitch.
- 3.6.6 Reconnect the garment to the hose set assembly, and check that within three complete pump cycles, the pump automatically senses the garment and resumes normal operation.
- 3.7 To stop the therapy, press the green **Run** button  and keep it depressed until the pump "beeps". The green LEDs on the front of the pump will extinguish and the compressor will stop.

**Note:** *The green LEDs do not illuminate when operating from the battery.*



**Figure 19 - Soft Function Buttons on the Membrane Label**

#### 4 Location of the Soft-Function Buttons on the Pump Membrane Label

Refer to Figure 19 for the position of the following four soft-function buttons on the membrane label:

- 4.1 A three-button keypad below the LCD display. These are used:
  - 4.1.1 During the "normal" operation of the pump.
  - 4.1.2 During service and repair operations (Refer to Page 5, Section 5).
- 4.2 A single "hidden" **Service** button above the LCD display.
  - 4.2.1 This is used during service and repair operations only.
  - 4.2.2 To access the service screen on the LCD display:
    - 4.2.2.1 Press and hold the **Service** button.
    - 4.2.2.2 The pump "beeps" when the service screen appears.

**Note:** *To prevent accidental operation of the **Service** button during normal pump operation, the **Service** button must be depressed for approximately 30 seconds before the service screen appears.*

#### 5 Using the Buttons below the Service Screen on the LCD Display

- 5.1 A typical service screen is shown in Figure 20.
- 5.2 To "scroll" through the list of options on the service screen, press the "normal" user buttons below the LCD display, as follows:
  - 5.2.1 Press the Down  icon to scroll down.

- 5.2.2 Press the Up  icon to scroll up.
- 5.3 To select the highlighted option on the LCD (the relevant text is shown inverted i.e. white text on a black background), press the Select  button below the LCD display.

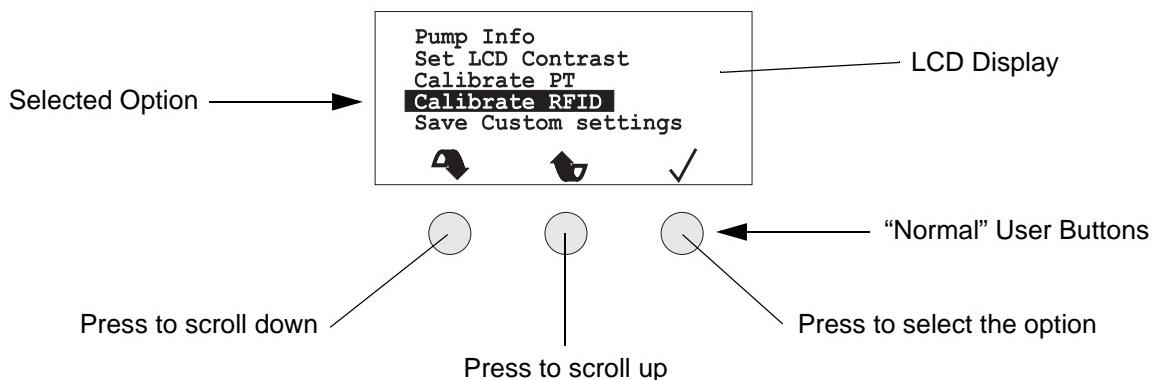
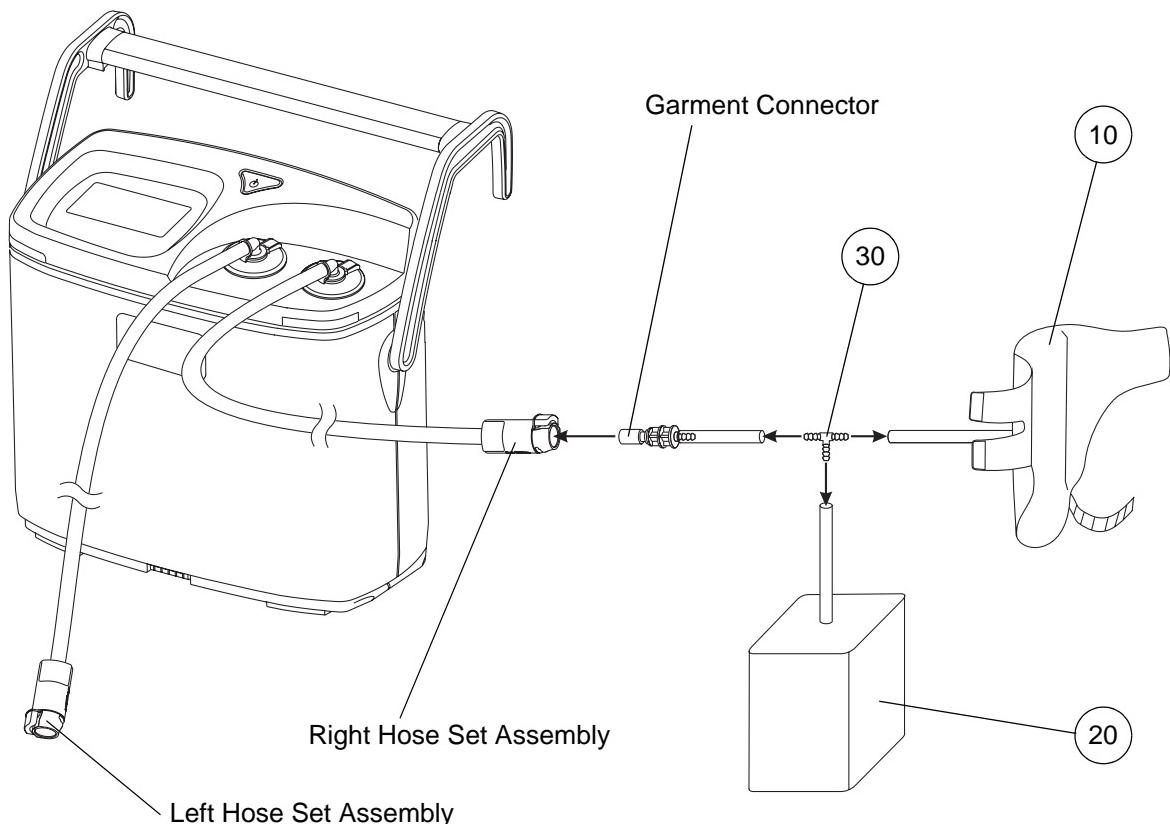


Figure 20 - LCD Display - Calibrate RFID

## 6 Preparation of the Calibration Test Equipment

- 6.1 Use a standard foot garment (Fig 21, Item 10) as part of the test equipment.
- 6.2 Find the approximate position of the middle of the foot garment tube, and using a sharp knife, cut the foot garment tube in two.
- 6.3 Insert a T-connector (Fig 21, Item 30) into the two cut ends of the foot garment tube.
- 6.4 Insert the remaining port on the T-connector into the tube connected to the calibrated pressure meter (Fig 21, Item 20).



**Note:** The Test Equipment must be connected to the Right Hose Set Assembly.  
The Left Hose Set Assembly is not used.

**Figure 21 - Calibration Test Equipment for the Pressure Transducer**

**Table 4 - Calibration Test Equipment for the Pressure Transducer**

Item	Test Equipment	Part Number
10	Foot Garment	FG100/FG200
20	Calibrated Pressure Meter, Accuracy < 1 mmHg, Range > 200 mmHg	-
30	T-Connector	-

## 7 Checking the Calibration of the Pressure Transducer

The test consists of running the compressor at 8 output levels: 5, 10, 15, 20, 25, 30, 31 and 32. Levels 30, 31 and 32 are used to check that the compressor is at its maximum output, and therefore the output pressure may not vary significantly between levels 30 and 32.

At each level, the compressor output stabilizes, and then the value of the output pressure shown on the LCD display is compared with the value shown on the external pressure meter. If the two values are within  $\pm 5$  mmHg of each other, then the pressure transducer is calibrated and the pump is able to provide accurate therapy. If not, the pressure transducer must be re-calibrated.

- 7.1 Prepare the calibration test equipment (Refer to Page 6, Section 6).

- 7.2 Make sure that no calibration test equipment or other garments are connected to either pump hose set assembly.
  - 7.3 Initialise the pump (Refer to Page 1, Section 1).
  - 7.4 Connect the right hose set assembly on the pump to the garment connector on the test equipment (Refer to Figure 21).
- Note:** *The calibration test equipment must only be connected to the right hose set assembly.  
Do not connect anything to the left hose set assembly.*
- 7.5 Press the “hidden” **Service** button on the membrane panel (Refer to Page 5, Section 4) to access the service screen on the LCD display (Refer to Figure 22).



Figure 22 - LCD Display - Calibrate PT

- 7.6 Using the **Down** and **Up** buttons below the LCD display (Refer to Page 5, Section 4), scroll down the list of options to **Calibrate PT**, and select it using the **✓** button below the LCD display. A new list of options will appear (Refer to Figure 23).

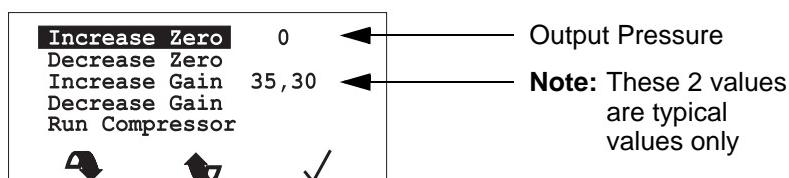


Figure 23 - LCD Display - Run Compressor

- 7.7 To start the test, scroll down the list of options to **Run Compressor**, and select it using the **✓** button. The compressor will start running at output level “5”, indicated by the **(5)** on the LCD display, and the **Output Pressure** shown on the LCD display should rise and then stabilize (Refer to Figure 24).

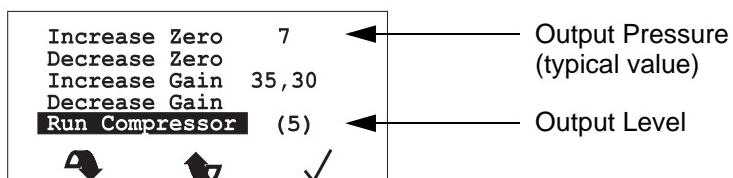


Figure 24 - LCD Display - Output Pressure

- 7.8 Compare the value of the **Output Pressure** on the LCD display with the value shown on the external pressure meter (Fig 21, Item 20):
  - 7.8.1 If the value of the **Output Pressure** on the LCD display is within ±5 mmHg of the value shown on the pressure meter, then continue with the test. Go to Para 7.9.
  - 7.8.2 If the value of the **Output Pressure** on the LCD display is **NOT** within ±5 mmHg of the value shown on the pressure meter, then do the following:

- 7.8.2.1 End this test, by scrolling down the list of options to **Exit**, and select it using the ✓ button.
  - 7.8.2.2 Carry out the procedure to re-calibrate the pressure transducer (Refer to Page 10, Section 8).
  - 7.8.2.3 Repeat this procedure to check the calibration of the pressure transducer (Refer to Page 7, Section 7).
- 7.9 With the **Run Compressor** option still highlighted, press the ✓ button again. The compressor output will increase to level “10”, indicated by the **(10)** on the LCD display, and the **Output Pressure** shown on the LCD display should rise and then stabilize.
- 7.10 Compare the value of the **Output Pressure** on the LCD display with the value shown on the external pressure meter:
- 7.10.1 If the value of the **Output Pressure** on the LCD display is within ±5 mmHg of the value shown on the pressure meter, then continue with the test. Go to Para 7.11.
  - 7.10.2 If the value of the **Output Pressure** on the LCD display is **NOT** within ±5 mmHg of the value shown on the pressure meter, then do the following:
    - 7.10.2.1 End this test, by scrolling down the list of options to **Exit**, and select it using the ✓ button.
    - 7.10.2.2 Carry out the procedure to re-calibrate the pressure transducer (Refer to Page 10, Section 8).
    - 7.10.2.3 Repeat this procedure to check the calibration of the pressure transducer (Refer to Page 7, Section 7).
- 7.11 Repeat Para 7.9 and Para 7.10 six more times, for compressor output levels “15”, “20”, “25”, “30”, “31” and “32”. After the final check of the compressor output at level “32”, continue the test at Para 7.12.
- Note:** Levels 30, 31 and 32 are used to check that the compressor is at its maximum output, and therefore the output pressure may not vary significantly between levels 30 and 32.
- 7.12 The calibration check of the pressure transducer is now complete, and the pump is able to provide accurate therapy. To end the test, do either of the following:
- 7.12.1 With the **Run Compressor** option still highlighted, press the ✓ button to stop the compressor.
  - 7.12.2 Scroll down the list of options to **Exit**, and select it using the ✓ button.

## 8 Re-calibrating the Pressure Transducer

- Note:** This procedure is carried out without opening the pump case.
- 8.1 Prepare the calibration test equipment (Refer to Page 6, Section 6).
  - 8.2 Make sure that no calibration test equipment or other garments are connected to either pump hose set assembly.
  - 8.3 Initialise the pump (Refer to Page 1, Section 1).
  - 8.4 Connect the right hose set assembly on the pump to the garment connector on the test equipment (Refer to Figure 21).
- Note:** The calibration test equipment must only be connected to the right hose set assembly.  
Do not connect anything to the left hose set assembly.
- 8.5 Press the “hidden” **Service** button on the membrane panel (Refer to Page 5, Section 4) to access the service screen on the LCD display (Refer to Figure 25).

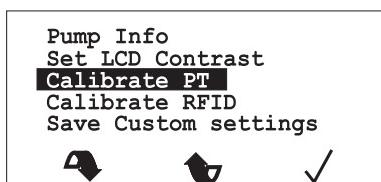


Figure 25 - LCD Display - Calibrate PT

- 8.6 Using the **Down** and **Up** buttons below the LCD display (Refer to Page 5, Section 4), scroll down the list of options to **Calibrate PT**, and select it using the **✓** button below the LCD display. A new list of options will appear (Refer to Figure 26).

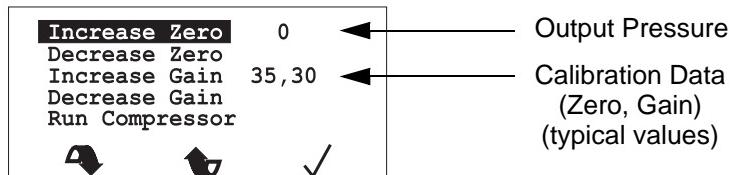


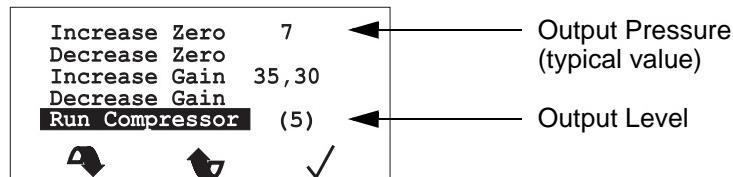
Figure 26 - LCD Display - Calibration Data

- 8.7 Before continuing with the re-calibration procedure, refer to the two **Calibration Data** values on the LCD display, and make a note of the **Zero** and **Gain** values (Refer to Figure 26).

**Note:** If the re-calibration procedure goes wrong, you can set the **Zero** and **Gain** values back to their original values, and then start the re-calibration procedure again.

- 8.8 Make sure the external pressure meter shows zero pressure.
- 8.9 Check the value of the **Output Pressure** shown on the LCD display (Refer to Figure 26). It should show zero pressure. If it does not show zero pressure, then adjust the zero calibration factor of the pump as follows:
  - 8.9.1 To increase the **Output Pressure** value, scroll through the list of options to **Increase Zero**. Each time the **✓** button is pushed, the **Output Pressure** value will increase.
  - 8.9.2 To decrease the **Output Pressure** value, scroll through the list of options to **Decrease Zero**. Each time the **✓** button is pushed, the **Output Pressure** value will decrease.
  - 8.9.3 As these adjustments are being made to the **Output Pressure** value, the **Zero** value on the **Calibration Data** will change (Refer to Figure 26).

- 8.10 To start the test, scroll down the list of options to **Run Compressor**, and select it using the ✓ button. The compressor will start running at output level "5", indicated by the (5) on the LCD display, and the **Output Pressure** shown on the LCD display should rise and then stabilize (Refer to Figure 27).



**Figure 27 - LCD Display - Output Pressure**

- 8.11 With the **Run Compressor** option still highlighted, press the ✓ button 5 more times. The compressor output will increase to level "30", indicated by the (30) on the LCD display, and the **Output Pressure** shown on the LCD display should rise and then stabilize.
- 8.12 Compare the value of the **Output Pressure** on the LCD display with the value shown on the external pressure meter:
- 8.12.1 If the value of the **Output Pressure** on the LCD display is within ±2 mmHg of the value shown on the pressure meter, then:
    - 8.12.1.1 Scroll down the list of options to **Exit**, and select it using the ✓ button. The compressor will stop.
    - 8.12.1.2 Go to Para 8.13, and continue the test.
  - 8.12.2 If the value of the **Output Pressure** on the LCD display is **NOT** within ±2 mmHg of the value shown on the pressure meter, then adjust the gain calibration factor of the pump as follows:
    - 8.12.2.1 To increase the **Output Pressure** value, scroll through the list of options to **Increase Gain**. Each time the ✓ button is pushed, the **Output Pressure** value will increase.
    - 8.12.2.2 To decrease the **Output Pressure** value, scroll through the list of options to **Decrease Gain**. Each time the ✓ button is pushed, the **Output Pressure** value will decrease.
    - 8.12.2.3 When the value of the **Output Pressure** on the LCD display is within ±1 mmHg of the value shown on the pressure meter, scroll down the list of options to **Back**, and select it using the ✓ button.
    - 8.12.2.4 Scroll down the list of options to **Real pressure display**, and select it using the ✓ button.
    - 8.12.2.5 Scroll down the list of options to **Exit**, and select it using the ✓ button. The compressor will stop.
    - 8.12.2.6 Go to Para 8.13, and continue the test.
- 8.13 Run the test to check the calibration of the pressure transducer (Refer to Page 7, Section 7).

## 9 Recalibrating the Pump Hose Set Assemblies

- 9.1 Initialise the pump (Refer to Page 1, Section 1).
- 9.2 Make sure that no garments are connected to either pump hose set assembly.
- 9.3 Press the “hidden” **Service** button on the membrane panel to access the service screen on the LCD display (Refer to Page 5, Section 4).
- 9.4 Using the **Down** and **Up** buttons (Refer to Page 5, Section 5), scroll down the list of options to **Calibrate RFID**, and select it using the  button (Refer to Figure 28).



Figure 28 - LCD Display - Calibrate RFID

- 9.5 A new list of options will appear. Scroll down the list of options to **Save as No Garment**, and select it using the  button (Refer to Figure 29).

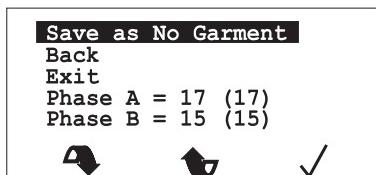
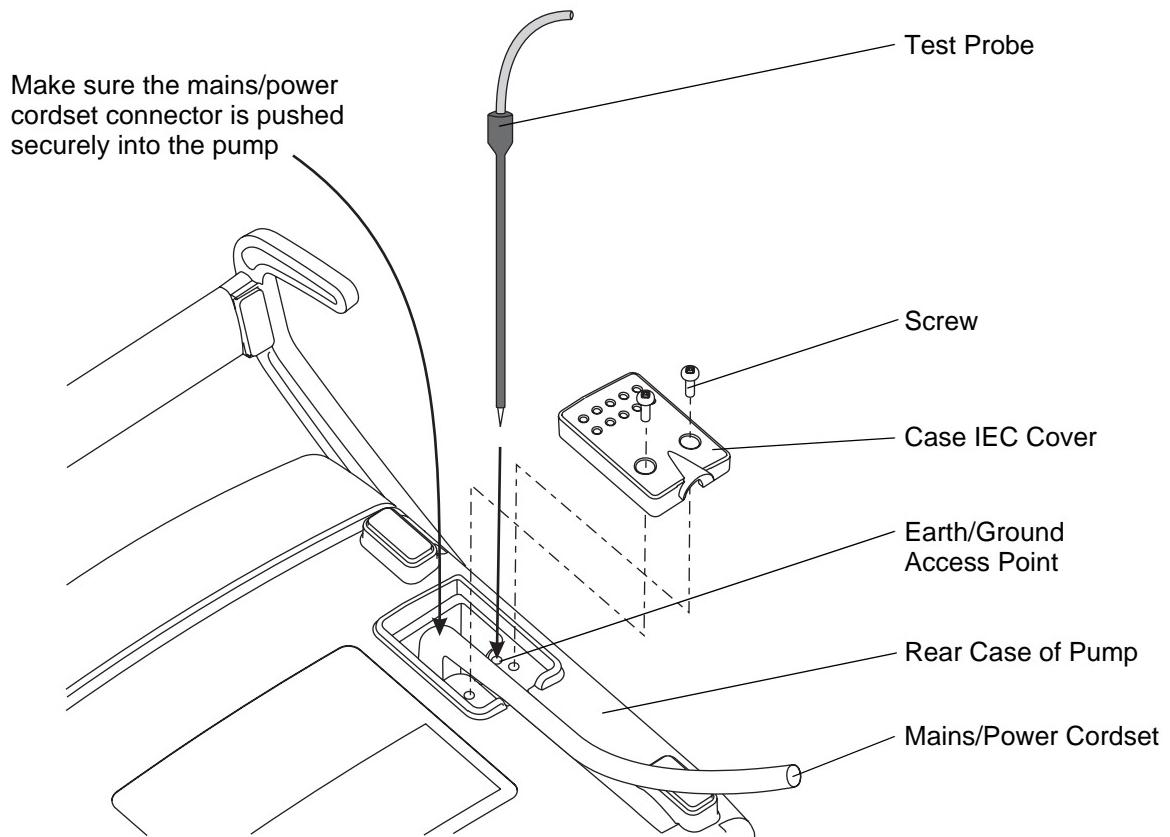


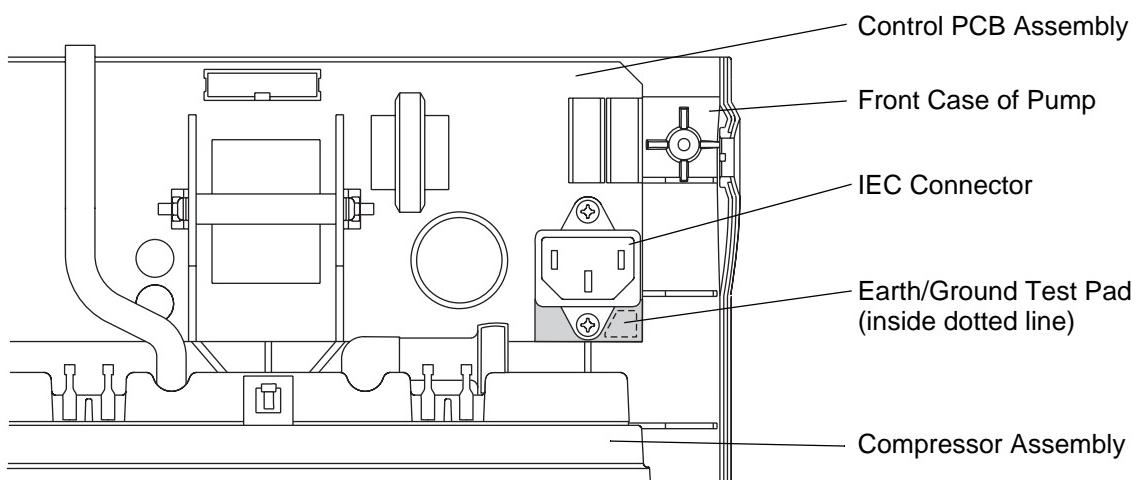
Figure 29 - LCD Display - Save as No Garment

- 9.6 Scroll down the list of options to **Exit**, and select it using the  button, to end the test.
- 9.7 If at any time the LCD display shows **Pump Fault - RFID**, then the hose set electrical connections are not fitted correctly at the pump end of the hose set assemblies. Check and rectify the electrical connections, or replace the hose set assemblies.



**Note:** Insert the end of the test probe through the test hole in the rear case.  
 Approximate dimensions of test probe:  
 Minimum length = 100 mm  
 Maximum diameter = 2 mm

**Figure 30 - Inserting the Test Probe through the Rear Case**



**Figure 31 - Earth/Ground Test Area on Control PCB Assembly**

## 10 Electrical Safety Testing

To test and calibrate the pump unit correctly, the test equipment in Table 5 is required.

**Table 5 - Electrical Test Equipment**

Item	Test Equipment
1	Insulation Resistance Tester (Megger), 500 Vdc
2	Portable Appliance Tester
3	Multimeter / Continuity Tester
4	Test Probe, Minimum Length 100 mm, Maximum Diameter 2 mm (approximate dims.)

### Electrical Safety Checks

There are several electrical safety checks that must be carried out after breakdown repairs and servicing. Where alternatives are given, the test will depend upon the available test equipment. The tests are as follows:

- Earth/Ground Continuity Test
- Insulation Resistance Test (Megger Test), or
- Earth/Ground Leakage Current Test (USA)

### Earth/Ground Continuity Test

This test checks the earth/ground wire continuity between the earth pin on the mains/power plug and the earth terminal on the PSU PCB.

On the Flowtron Universal, the earth/ground wire is connected to a special earth/ground test pad on the PSU PCB assembly (Refer to Figure 31). A voltage is established between this earth/ground test pad and the earth/ground pin of the pump's mains/power cordset, and the resistance is checked.

To access this earth/ground test pad, there is an earth/ground access point (a small hole, approximately 3 mm diameter) underneath the case IEC cover on the rear case of the pump (Refer to Figure 30). The earth/ground test pad itself is approximately 90 mm below this access point, on the corner of the control PCB assembly. Therefore the test probe needs to have the following approximate dimensions:

- Minimum Length = 100 mm.
- Maximum Diameter = 2 mm.

This long test probe (Table 5, Item 5) must be inserted carefully to make sure that it makes contact with the earth/ground test pad, and does not miss the control PCB assembly completely (Refer to Figure 30).

### Test Procedure

**WARNING: BEFORE REMOVING THE CASE IEC COVER, MAKE SURE THE PUMP UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.**

**Note:** Refer to Figures 30 and 31 to carry out this procedure.

- 10.1 Remove the case IEC cover from the rear case of the pump (Chapter 5, Page 6, Section 3).
- 10.2 Make sure the mains/power cordset connector is pushed fully into the IEC connector on the control PCB assembly inside the pump.
- 10.3 Insert the long test probe (Table 5, Item 5) through the earth/ground access point in the rear case, and down onto the earth/ground test pad on the control PCB assembly.

**Note:** This is made easier if the pump is horizontal, and the probe is inserted vertically.

- 10.4 Connect the other end of the test equipment to the earth/ground pin on the pump's mains/power cordset.
- 10.5 A 25A (nominal) current is passed for 10 seconds between the earth/ground test pad on the control PCB assembly and the earth/ground pin of the mains/power cordset. The resistance should **NOT** exceed 0.2Ω.

**Note:** *If the test equipment shows a very high resistance value, it is probably due to the test probe not touching the earth/ground test pad. Remove and re-insert the test probe or a broken earth/ground wire.*

**Note:** *This test can be conducted with a Portable Appliance Tester. Alternatively, a Multimeter/Continuity Tester can be utilised, but the resistance is tested using a much lower current.*
- 10.6 Remove the test probe from the earth/ground access point on the pump.
- 10.7 Install the case IEC cover to the rear case of the pump (Chapter 5, Page 6, Section 4).

### Insulation Resistance Test

This test checks the integrity of the pump's insulation.

This test is applied between the live and neutral wires (connected together), and earth/ground.

#### Test Procedure

- 500 Vdc is applied to the insulation and the measured resistance must be greater than 2MΩ.

**Note:** *This test can be conducted using a Portable Appliance Tester.*

### Earth/Ground Leakage Current Test (USA)

This test measures the current flowing through the earth/ground wire in accordance with the ANSI-AAMI ESI-1993 Standard (American National Standard Safe Current Limits for Electromedical Apparatus) or as specified in UL 60601-1).

***WARNING: DANGER OF ELECTRIC SHOCK. DO NOT TOUCH ANY EXPOSED PARTS WHILE CONDUCTING THIS TEST. DO NOT TOUCH ANY PART OF YOUR BODY WITH THE CONTACTS OF THE PROBES.***



## CHAPTER 5

### PUMP REPAIR

**WARNING: BEFORE DISMANTLING THE PUMP, ENSURE UNIT HAS BEEN ISOLATED FROM THE POWER SUPPLY BY REMOVING THE CORD PLUG FROM THE WALL OUTLET.**

#### 1 General

This chapter details repair procedures for the **Flowtron Universal** pump. All repairs should be carried out by ArjoHuntleigh approved service personnel.

**CAUTION:** *Do NOT remove the hose set assemblies from the pump unless it is part of the particular repair procedure. The elbow retaining covers on the hose set assemblies are not designed to be removed from the pump more than a couple of times. If the hose set assemblies are removed unnecessarily, the screw cover hinges on them may split, and then the complete hose set assemblies will have to be replaced.*

**Note:** *If the rear case of the pump is removed for any reason, the mains/power cordset will normally be removed first (Refer to Page 7, Section 6). However, the pump has a fail-safe design, which means that if the rear case is removed with the mains/power cordset still connected to the pump, the mains/power cordset connector will be automatically removed with the rear case, and so the mains/power will be immediately disconnected from the pump.*

- 1.1 Page 2, Table 6 defines the testing which must be carried out following each repair:
  - 1.1.1 To check the Basic Pump Operation, refer to Chapter 4, Page 3, Section 3.
  - 1.1.2 To carry out the Garment Recognition Test, refer to Chapter 4, Page 1, Section 2.
  - 1.1.3 To Recalibrate the Hose Sets, refer to Chapter 4, Page 12, Section 9.
  - 1.1.4 To Reset the Service Log, refer to Chapter 3, Page 3, Section 3.2.
  - 1.1.5 To carry out the Electrical Safety Tests, refer to Chapter 4, Page 14, Section 10.

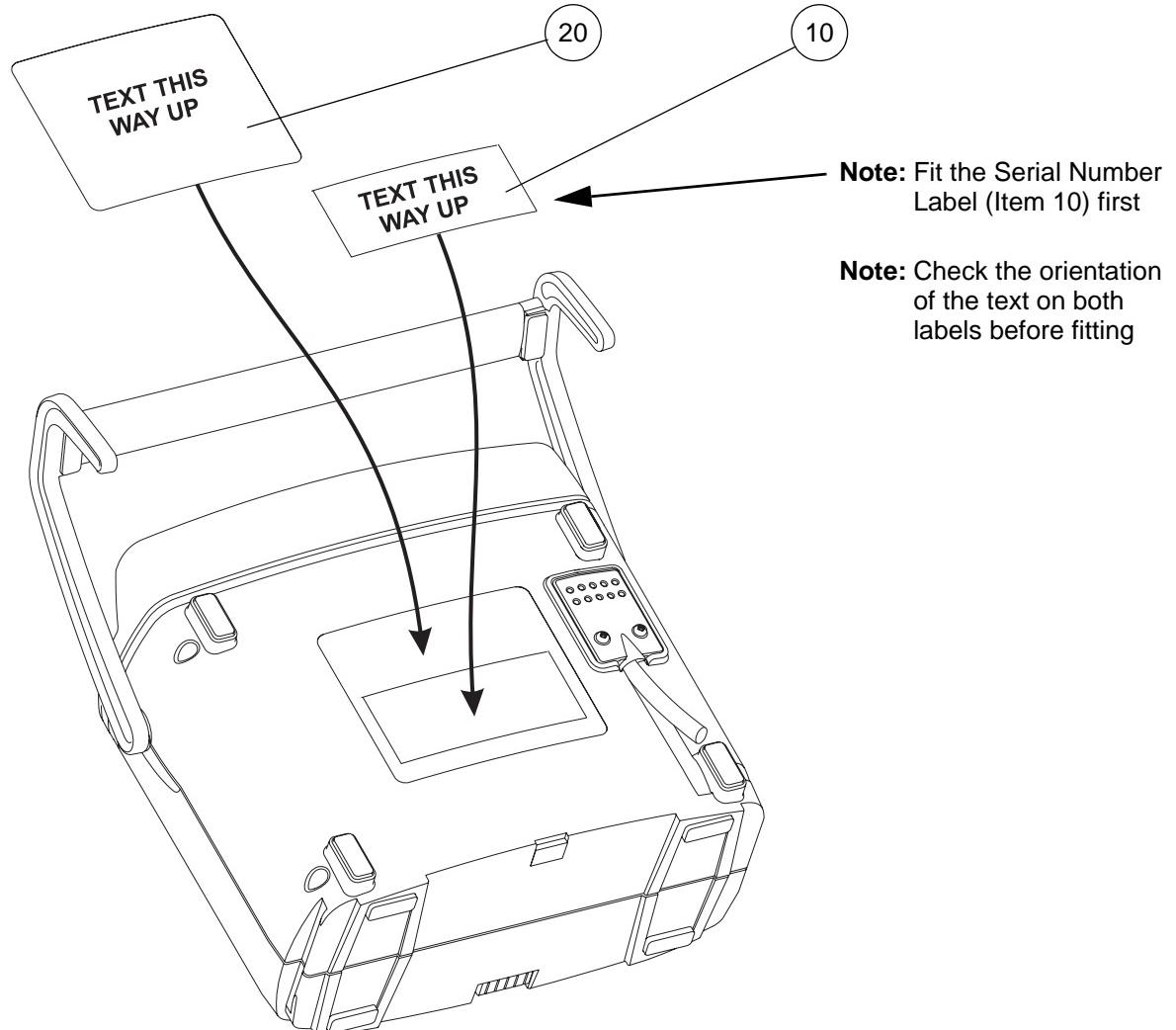
**Table 6 - Repair to Testing Requirements**

<b>Components / Assemblies</b>	<b>Basic Pump Operation</b>	<b>Garment Recognition Test</b>	<b>Recalibrate Hose Sets</b>	<b>Reset Service Log</b>	<b>Electrical Safety Tests</b>
Mains/Power Cordset	Yes	No	No	No	Yes
Case Inlet Filter Felt	Yes	No	No	No	No
Hose Set Assembly	Yes	Yes	Yes	No	No
Rear Case	Yes	No	No	No	No
Front Case	Yes	No	No	No	Yes
Case Top + Membrane Label Assembly	Yes	Yes	Yes	No	Yes
Handle and Hook Assembly	Yes	No	No	No	No
Motor and Manifold Assembly	Yes	No	No	No	Yes
Compressor Assembly	Yes	No	No	No	Yes
Compressor Inlet Filter	Yes	No	No	No	No
Power Supply PCB Assembly	Yes	No	No	No	Yes
Control PCB + LCD Display Assembly	Yes	Yes	Yes	No	Yes
<b>Run Button</b>	Yes	No	No	No	Yes
Fuses on Power Supply PCB Assembly	Yes	No	No	No	Yes
Rechargeable Battery	Yes	Yes	No	Yes	Yes

## 2 Pump Labels

**Note:** The labels must be stuck on in the correct order.

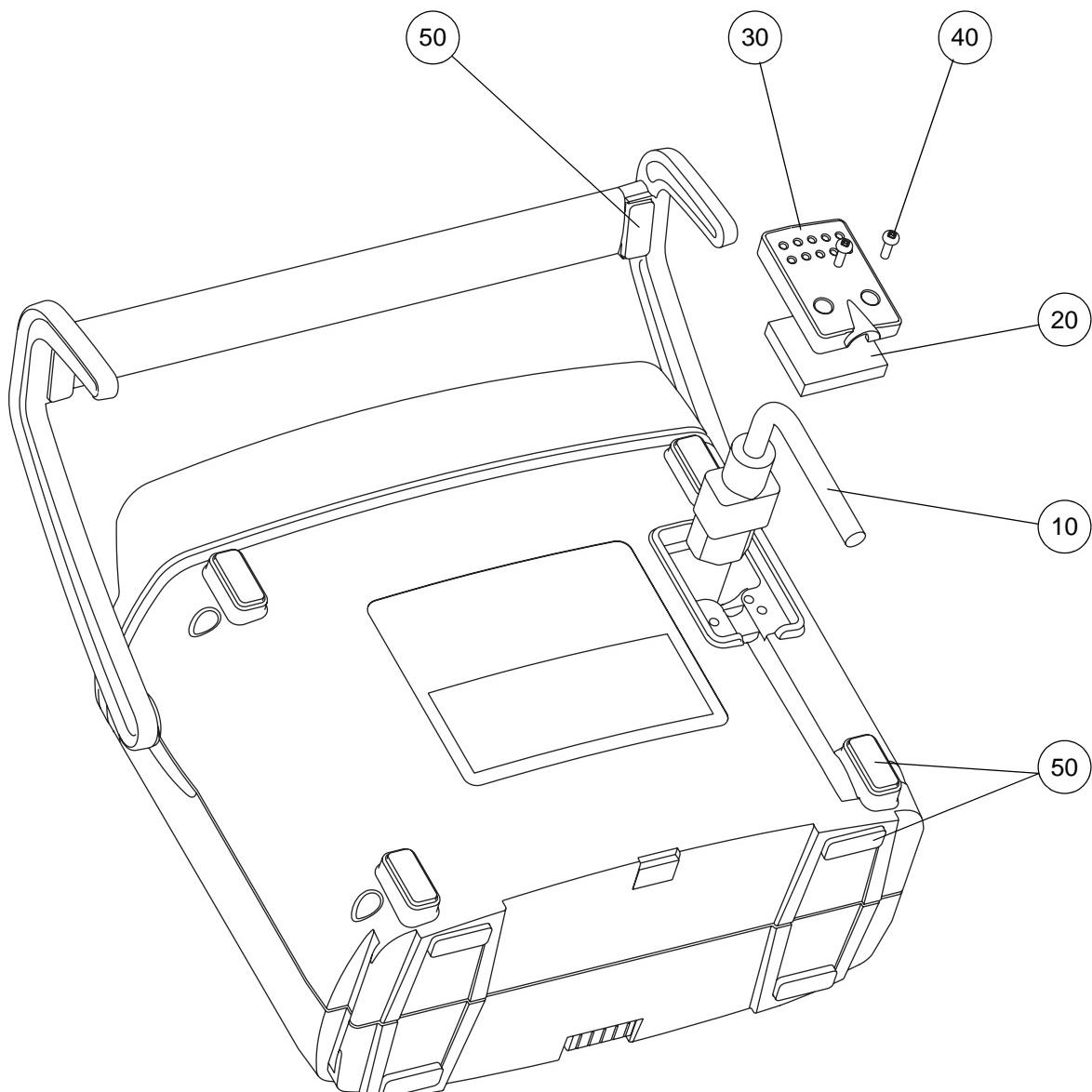
- 2.1 Stick the serial number label (Fig 32, Item 10) onto the rear case. Make sure the orientation of the text on the serial number label is correct (Refer to Figure 32).
- 2.2 Put the product label (Fig 32, Item 20) over the serial number label, and stick it onto the rear case. Make sure the orientation of the text on the product label is correct (Refer to Figure 32).



**Figure 32 - Pump Labels**

**Table 7 - Pump Label Parts List**

Item	Part Number	Description	Qty
10	REF	Pump Serial Number Label	1
20	LAB339	Pump Product Label	1



**Figure 33 - Replacing the Mains/Power Cordset and Inlet Filter Felt**

**Table 8 - Mains/Power Cordset and Inlet Filter Felt Parts List**

Item	Part Number	Description	Qty
10	Refer to Table 9	Mains/Power IEC Cordset	1
20	507374	Inlet Filter Felt	1
30	507315	Case IEC Cover	1
40	FAS045	Screw, M3 x 10mm Pan Head	2
50	507413	Rubber Foot	10

**Table 9 - Main/Power Cordset version part numbers**

Product Model No. (old Model No.)	Cable Part No./Description							
	507398 UK mains lead IEC	507375 USA mains lead IEC	507399 Schuko mains lead IEC	507461 Australian mains lead IEC	CAB302* Short male IEC to female IEC	CAB312 China IEC straight coiled cable	CAB310 Japan IEC straight coiled cable	CAB311 S. African/Indian IEC straight/coiled cable
507001 (AC600/UK)								
507003 (AC600/US)								
507004DE (AC600/DE)								
507004DK (AC600/DK)								
507004ES (AC600/ES)								
507004FR (AC600/FR)								
507004IT (AC600/IT)								
507004NL (AC600/NL)								
507009AU (AC600/AU)								
507009CN (AC600/CN)								
507009JP (AC600/JP)								
507009ZA (AC600/ZA)								
507EUR								
507UNI (2 part lead)								
507UNI (2 part lead)								
507UNI (2 part lead)								

**Note:** Item marked \*CAB302 is a short male IEC to female IEC lead fitted to Chinese, Japanese, Indian and South African 507UNI pumps only, along with the relevant country-specific mains lead (CAB310 Japanese, CAB311 South African/Indian and CAB312 Chinese).

### 3 Removing the Case IEC Cover

**WARNING: BEFORE REMOVING THE CASE IEC COVER, MAKE SURE THE PUMP UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.**

- 3.1 Lay the pump face down on a flat surface.
- 3.2 Remove the two screws (Fig 33, Item 40), the case IEC cover (Fig 33, Item 30) and the inlet filter felt (Fig 33, Item 20) out of the rear case.

**Note:** *The case IEC cover is a tight fit in the rear case. Removal of this cover is made easier if the two screws are removed completely from the cover, and then the mains/power cordset (Fig 33, Item 10) is gently moved up and down while the cover is removed.*

### 4 Installing the Case IEC Cover

- 4.1 Make sure the mains/power IEC cordset connector (Fig 33, Item 10) is pushed fully into the IEC connector inside the pump. Place the cordset cable into the groove in the rear case.

**Note:** *Make sure the cordset cable is not pulled tight when it is installed into the rear case. There should be some slack in the cordset cable under the case IEC cover.*

- 4.2 Push the case IEC cover (Fig 33, Item 30) and inlet filter felt (Fig 33, Item 20) into the slot in the rear case.
- 4.3 Install the two screws (Fig 33, Item 40) to secure the case IEC cover.

## 5 Replacing the Inlet Filter Felt

- 5.1 Remove the case IEC cover (Refer to Page 6, Section 3).
- 5.2 Remove the inlet filter felt (Fig 33, Item 20) from the back of the case IEC cover (Fig 33, Item 30), and discard.
- 5.3 Push the new inlet filter felt into the back of the case IEC cover.
- 5.4 Install the case IEC cover (Refer to Page 6, Section 4).

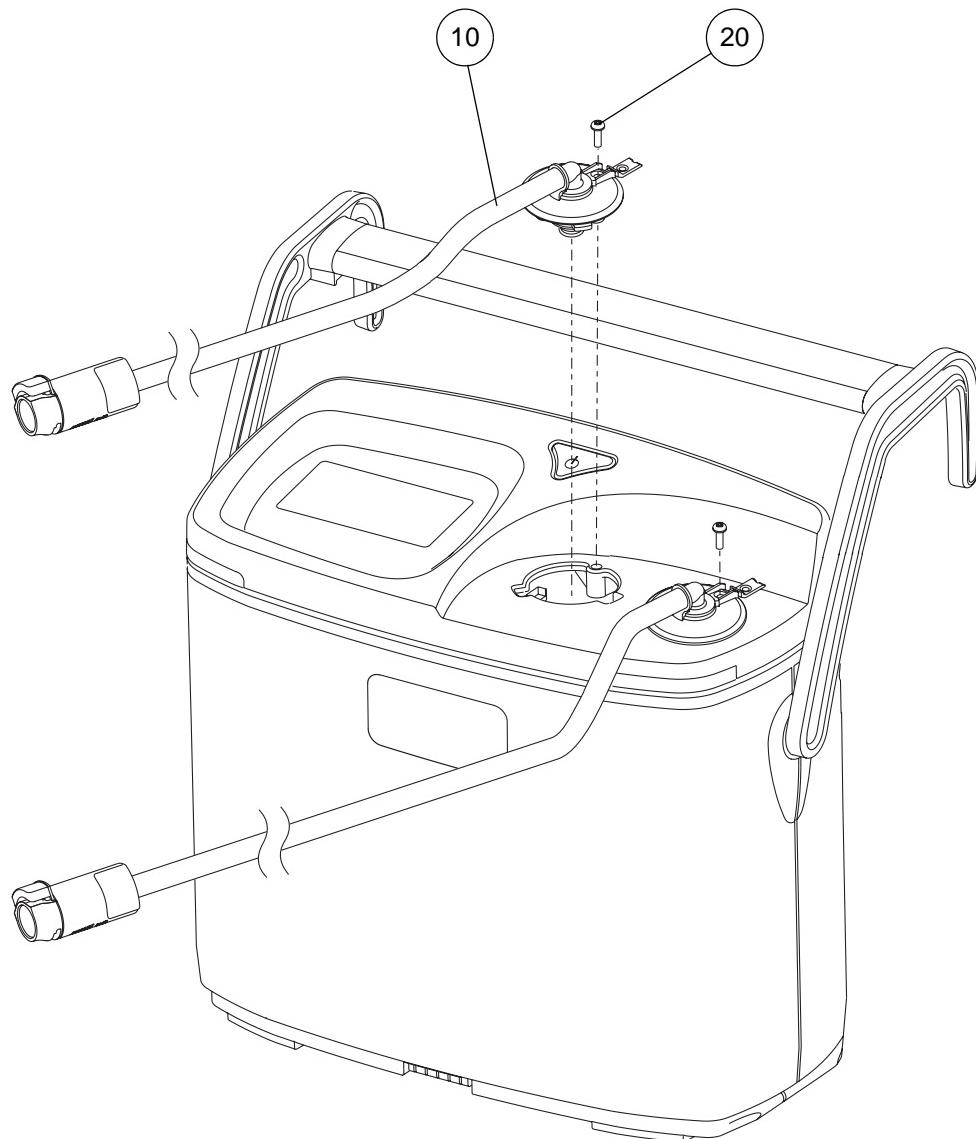
## 6 Removing the Mains/Power Cordset

- 6.1 Remove the case IEC cover (Refer to Page 6, Section 3).
- 6.2 Pull the mains/power IEC cordset connector (Fig 33, Item 10) out of the IEC connector inside the pump.

## 7 Installing the Mains/Power Cordset

**CAUTION:** *Make sure the replacement mains/power cordset (Fig 33, Item 10) is the correct type and rating, or the electrical safety of the pump may be impaired.*

- 7.1 Carefully push the mains/power IEC cordset connector (Fig 33, Item 10) fully into the IEC connector inside the pump. Place the cordset cable into the groove in the rear case.  
**Note:** *Make sure the cordset cable is not pulled tight when it is installed into the rear case. There should be some slack in the cordset cable under the case IEC cover.*
- 7.2 Install the case IEC cover (Refer to Page 6, Section 4).



**Figure 34 - Replacing the Hose Sets**

**Table 10 - Hose Set Parts List**

Item	Part Number	Description	Qty
10	507500	Hose Set Assembly, Spares Item	2
20	FAS045	Screw, M3 x 10mm Pan Head	2

## 8 Removing the Hose Set Assembly

**WARNING:** BEFORE REPLACING THE HOSE SET ASSEMBLY, MAKE SURE THE PUMP UNIT HAS BEEN ISOLATED FROM THE MAINS/POWER SUPPLY BY REMOVING THE MAINS/POWER PLUG FROM THE WALL SOCKET.

**CAUTION:** The elbow retaining cover on the hose set assembly is not designed to be removed from the pump more than a couple of times. If the screw cover is opened and closed more than two or three times, the screw cover hinge may split, and then the complete hose set assembly will have to be replaced.

The hose set assembly (Fig 34, Item 10) comprises a length of tube with a pump connector at one end and a garment connector at the other.

The pump connector comprises an elbow connector, through which the pneumatic flow is directed, and an elbow retaining cover, which secures the elbow connector to the top case assembly on the pump.

The garment connector contains a sense coil which is used to automatically recognise the type of garment fitted to the connector (e.g. foot garment, or single chamber calf garment).

A cable passes through the middle of the tube and out of the side of the elbow retaining cover, to connect the sense coil in the garment connector to a 6-way connector on the control board assembly in the pump.

To remove the hose set assembly from the top of the pump, carry out the following procedure:

- 8.1 Using a small flat-bladed screwdriver, carefully lift the screw cover on the elbow retaining cover to reveal the screw underneath (Refer to Figure 35).
- 8.2 Remove the screw (Fig 34, Item 20), and retain for future use.

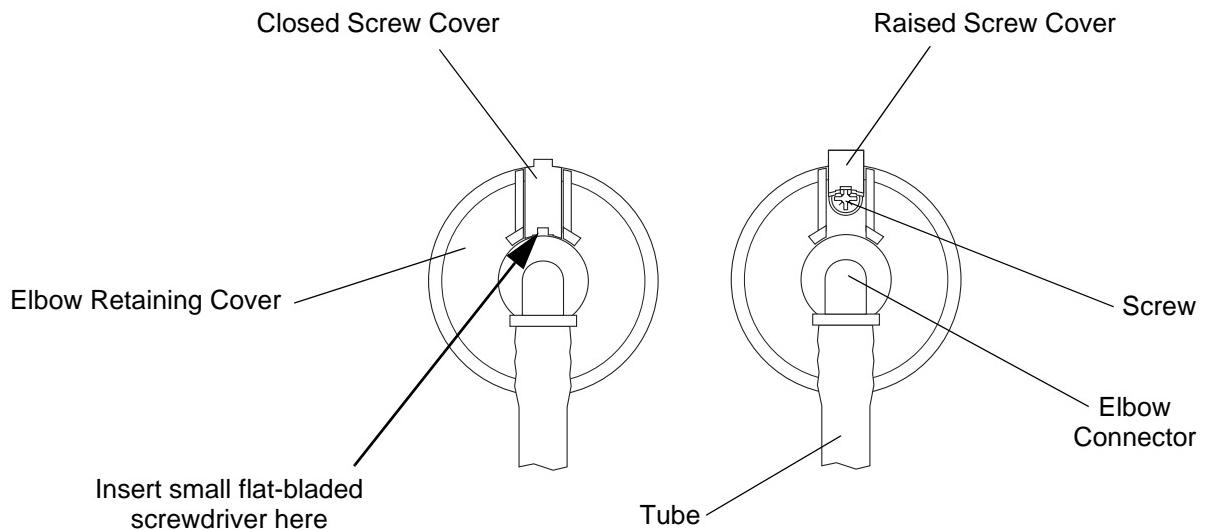
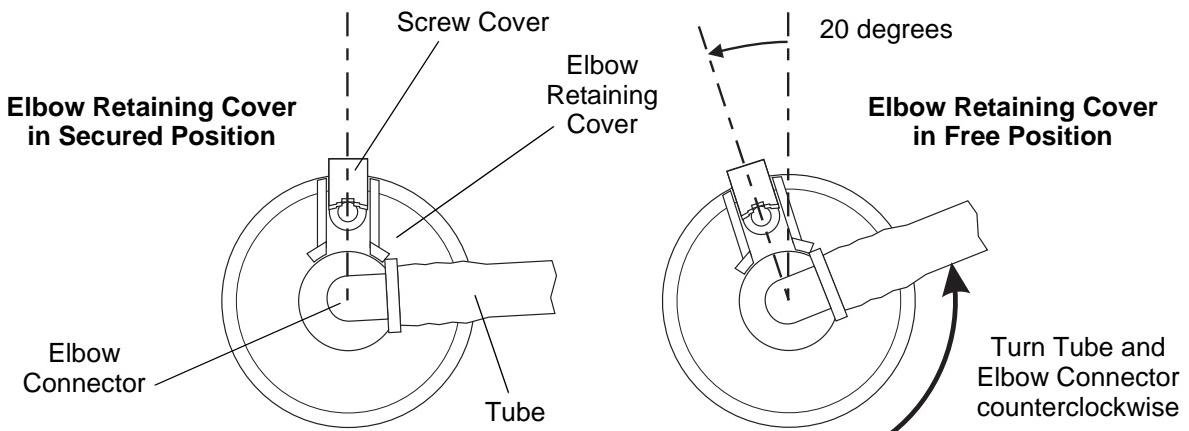


Figure 35 - Lifting the Hose Set Connector Flap

- 8.3 Turn the elbow retaining cover approximately 20 degrees counterclockwise, to the "free" position (Refer to Figure 36).

**Note:** To turn the elbow retaining cover more easily, use the tube and elbow connector to provide extra leverage. Turn the tube and elbow connector counterclockwise until the elbow connector touches the screw cover, and then continue turning them to turn the elbow retaining cover (Refer to Figure 36).

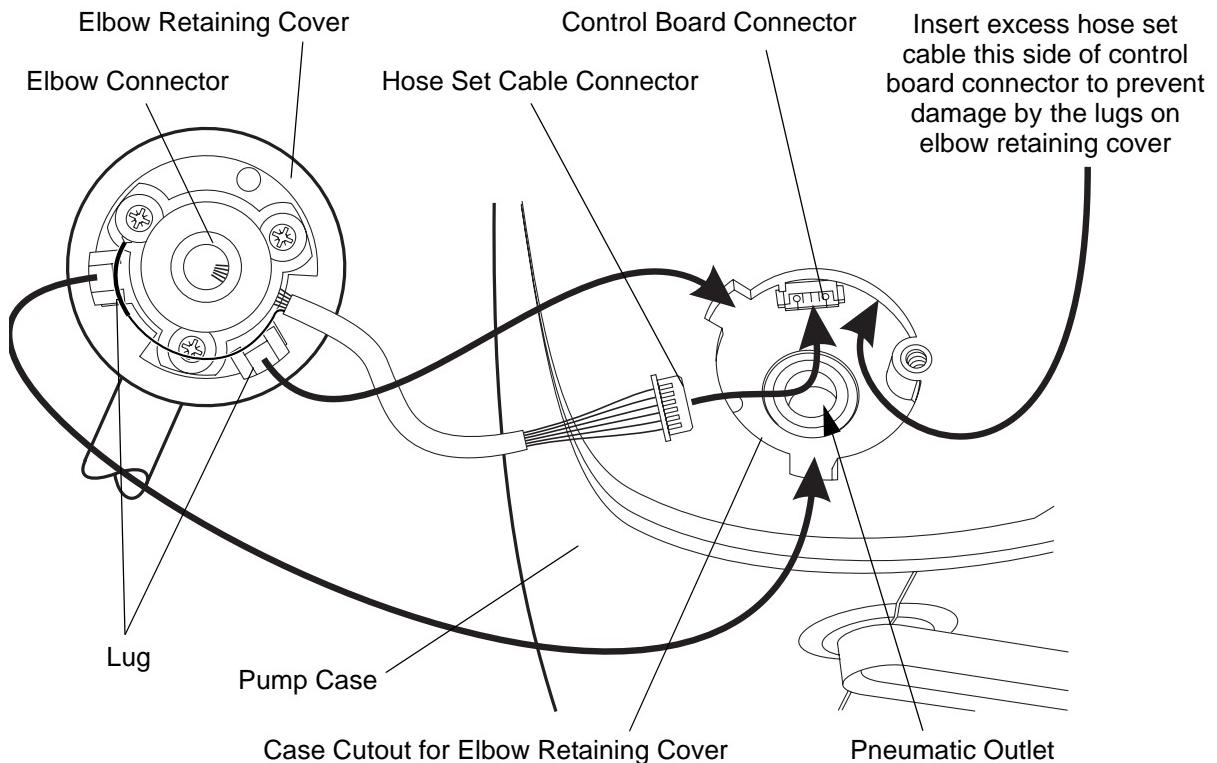
- 8.4 Carefully lift the elbow retaining cover and elbow connector out of the pump case to reveal the cable connection between the elbow retaining cover and the pump.
- 8.5 Disconnect the hose set cable connector from the 6-way connector on the control board assembly in the pump (Refer to Figure 37), and remove the hose set assembly from the pump.



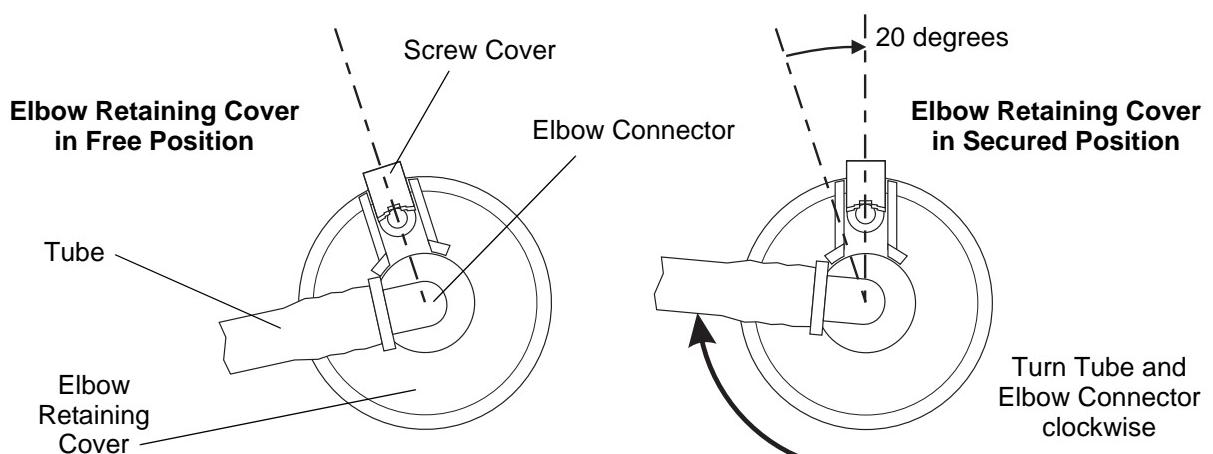
**Figure 36 - Releasing the Hose Set Connector**

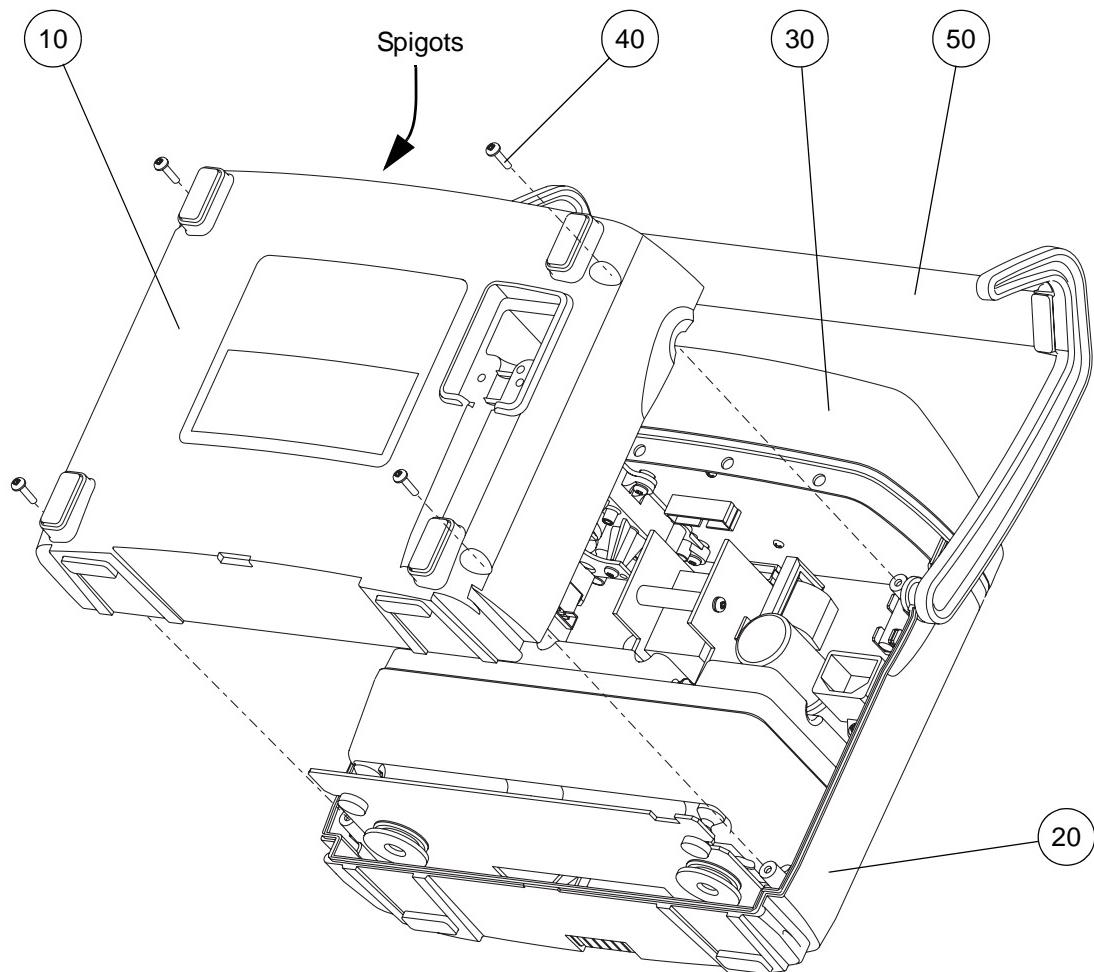
## 9 Installing the Hose Set Assembly

- 9.1 If you want to re-fit the same hose set assembly which was removed from the pump, then inspect the screw cover on the elbow retaining cover on the hose set assembly (Refer to Figure 35). If the screw cover or hinge is damaged or split, then replace the hose set assembly.  
**Note:** *It is not necessary to replace both hose set assemblies if only one is damaged.*
- 9.2 Put the hose set assembly (Fig 34, Item 10) by the pump, with the elbow retaining cover adjacent to the case cutout in the top of the pump.
- 9.3 Plug the hose set cable connector into the 6-way connector on the control board in the pump.  
**Note:** *Make sure the hose set cable connector is pushed fully into the control board connector.*
- 9.4 Carefully insert the excess hose set cable inside the pump case, between the control board connector and the threaded pillar (Refer to Figure 37).  
**Note:** *Do not insert the excess hose set cable the other side of the control board connector or it might get damaged by the lugs on the elbow retaining cover.*  
**Note:** *Make sure the cable is always clear of the pneumatic outlet in the pump.*
- 9.5 Install the elbow retaining cover fully into the cutout in the pump case.  
**Note:** *Make sure the two lugs on the elbow retaining cover are aligned with the correct slots in the cutout in the pump case (Refer to Figure 37).*

**Figure 37 - Installing the Hose Set Connectors**

- 9.6 When the elbow retaining cover is installed into the pump case cutout, turn the elbow retaining cover approximately 20 degrees clockwise, to the "secured" position (Refer to Figure 38).  
**Note:** *To turn the elbow retaining cover more easily, use the tube and elbow connector to provide extra leverage. Turn the tube and elbow connector counterclockwise until the elbow connector touches the screw cover, and then continue turning them to turn the elbow retaining cover (Refer to Figure 38).*
- 9.7 When the elbow retaining cover is in the correct position, install the screw (Fig 34, Item 20) and tighten it to secure the hose set assembly to the pump.
- 9.8 Carefully press down the screw cover until it clicks into position (Refer to Figure 35).

**Figure 38 - Securing the Hose Set Connector**



Note the orientation of the Handle and Hook Assembly (Item 50)

**Figure 39 - Replacing the Rear Case and Handle**

**Table 11 - Rear Case, Front Case, Top Case and Handle Parts List**

Item	Part Number	Description	Qty
10	507302	Rear Case	1
20	507396	Front Case, Printed Flowtron Universal	1
30	507421	Top Case Assy, with Window & Membrane Label, Spares Item	1
40	FAS223	Screw, 3 dia x 10 Pan Head	4
50	507419	Handle and Hook Assembly, Spares Item	1

## 10 Removing the Rear Case from the Pump

**Note:** *It is not necessary to remove the hose set assemblies from the pump in order to remove the rear case from the pump.*

- 10.1 Remove the mains/power cordset from the pump (Refer to Page 7, Section 6).
- 10.2 Lay the pump face down on a flat surface.
- 10.3 Remove the four screws (Fig 39, Item 40) and lift the rear case (Fig 39, Item 10) away from the front case (Fig 39, Item 20) and top case assembly (Fig 39, Item 30).

## 11 Installing the Rear Case onto the Pump

- 11.1 Lay the front case (Fig 39, Item 20) and top case assembly (Fig 39, Item 30) down with the inside surface pointing upwards.

- 11.2 Install the rear case (Fig 39, Item 10) onto the front case and top case assembly.

**Note:** *Make sure the five spigots on the underside of the rear case locate in the corresponding holes in the top case assembly.*

- 11.3 Install the four screws (Fig 39, Item 40) to secure the rear case to the front case.

- 11.4 Install the mains/power cordset to the pump (Refer to Page 7, Section 7).

## 12 Removing the Handle and Hook Assembly

- 12.1 Remove the rear case from the front case (Refer to Page 13, Section 10).

- 12.2 Lay the front case (Fig 39, Item 20) and top case assembly (Fig 39, Item 30) down with the inside surface pointing upwards.

- 12.3 Lift the handle and hook assembly (Fig 39, Item 50) out of the front case.

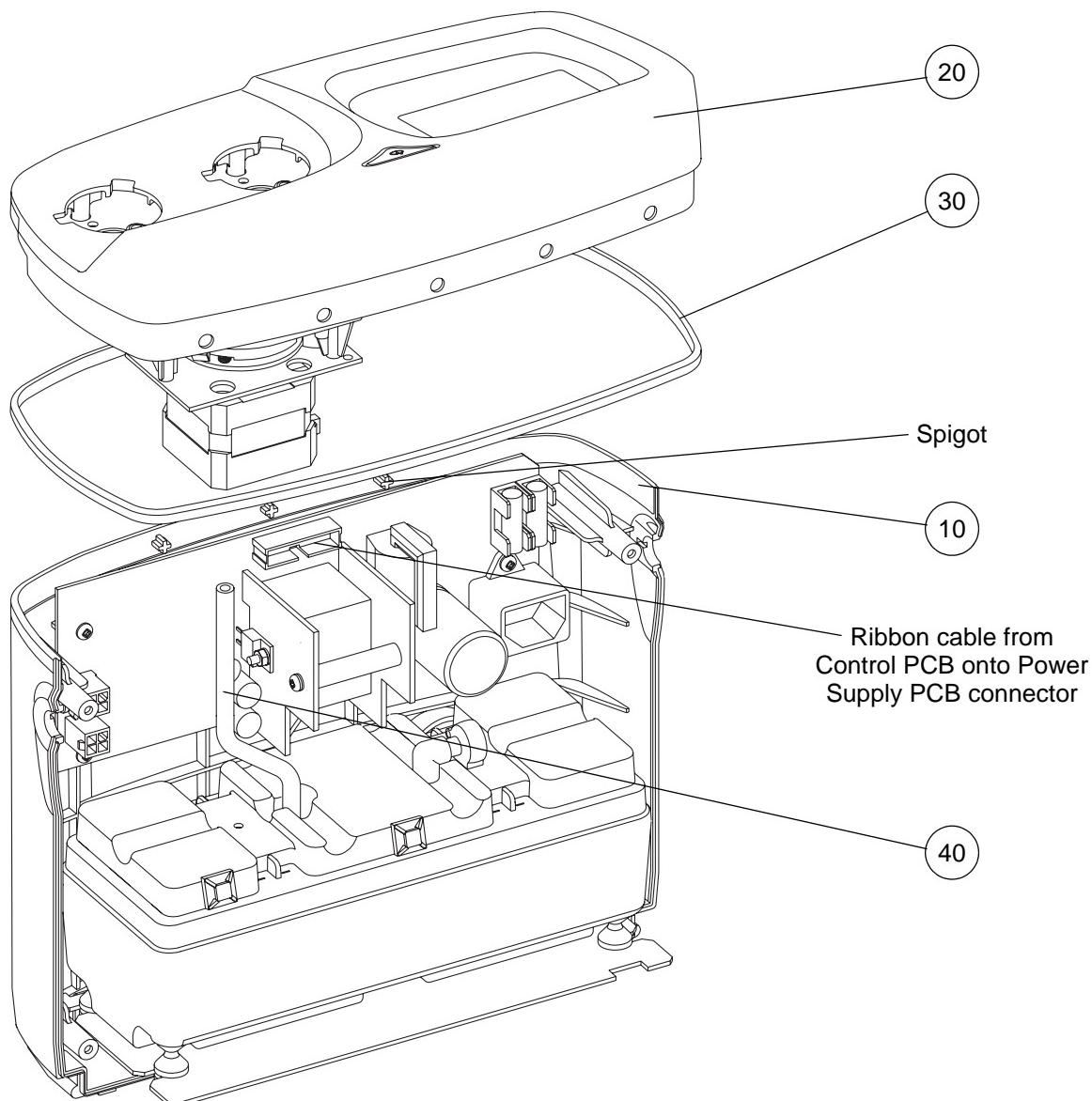
## 13 Installing the Handle and Hook Assembly

- 13.1 Lay the front case (Fig 39, Item 20) and top case assembly (Fig 39, Item 30) down with the inside surface pointing upwards.

- 13.2 Install the handle and hook assembly (Fig 39, Item 50) into the semi-circular cutouts in the front case.

**Note:** *Make sure the orientation of the handle and hook assembly is correct. The open part of the hook should point upwards (Refer to Figure 39).*

- 13.3 Install the rear case onto the front case (Refer to Page 13, Section 11).



**Figure 40 - Separating the Top Case Assembly from the Front Case**

**Table 12 - Top Case and Front Case Parts List**

Item	Part Number	Description	Qty
10	507396	Front Case, Printed Flowtron Universal	1
20	507421	Top Case Assy, with Window & Membrane Label, Spares Item	1
30	507306	Case Style Gasket	1
40	631073	Tube, 100mm long (Compressor - Motor & Manifold Assy)	1

## 14 Separating the Top Case Assembly from the Front Case

**CAUTION:** *Do NOT remove the hose set assemblies from the pump (Refer to Page 9, Section 8) unless the top case assembly or the control PCB assembly is being replaced (the motor and manifold assembly can be replaced without removing the hose set assemblies). The elbow retaining covers on the hose set assemblies are not designed to be removed from the pump more than a couple of times. If the hose set assemblies are removed unnecessarily, the screw cover hinges on them may split, and then the complete hose set assemblies will have to be replaced.*

When the rear case has been removed from the pump, the top case assembly (Fig 40, Item 20) is held in position on the front case (Fig 40, Item 10) by three spigots on the front case which locate in the corresponding holes in the top case assembly.

There are also two connections between the top case assembly and the front case:

- A ribbon cable connection from the control PCB assembly (in the top case assembly) to the power supply PCB assembly (in the front case).
- A large diameter tube (Fig 40, Item 40) from the motor and manifold assembly (in the top case assembly) to the compressor assembly (in the front case).

- 14.1 Remove the hose set assemblies from the pump (Refer to Page 9, Section 8), but **ONLY** if the top case assembly or the control PCB assembly is being replaced (the motor and manifold assembly can be replaced without removing the hose set assemblies). Otherwise, the top case assembly can be separated from the front case with the hose set assemblies installed on the pump.
- 14.2 Remove the handle and hook assembly, and the rear case, from the pump (Refer to Page 13, Section 12).
- 14.3 Carefully lift the top case assembly (Fig 40, Item 20) off the three spigots on the front case (Fig 40, Item 10).

**Note:** *Removal of the ribbon cable and tube between the top case assembly and the front case is made easier if the top case assembly is separated from the front case first.*

- 14.4 Disconnect the following from between the top case assembly and the front case (Refer to Figure 40):
  - The ribbon cable connector from the top of the power supply PCB assembly.
  - The large diameter tube (Fig 40, Item 40) from either the motor and manifold assembly or the compressor assembly.
- 14.5 Remove the top case assembly from the front case, and the case style gasket (Fig 40, Item 30) from the top case assembly.

## 15 Installing the Top Case Assembly onto the Front Case

- 15.1 Install the case style gasket (Fig 40, Item 30) fully onto the top case assembly (Fig 40, Item 20).
- 15.2 Place the top case assembly by the top of the front case (Fig 40, Item 10). The inside surface of the front case and the five holes in the top case assembly must both be uppermost.
- 15.3 Connect the following between the top case assembly and the front case (Refer to Figure 40):
  - 15.3.1 The ribbon cable connector onto the top of the power supply PCB assembly.
  - 15.3.2 The large diameter tube (Fig 40, Item 40) onto either the motor and manifold assembly or the compressor assembly.

**Note:** Make sure the tube is connected to the correct inlet tube on the motor and manifold assembly (Refer to Figure 41).
- 15.4 Install the top case assembly onto the front case.

**Note:** Make sure the three spigots at the top of the front case locate in the corresponding holes on the underside of the top case assembly.
- 15.5 Install the handle and hook assembly, and the rear case, onto the pump (Refer to Page 13, Section 13).
- 15.6 If the hose set assemblies were removed from the pump, then inspect and install new or the original hose set assemblies (Refer to Page 10, Section 9).

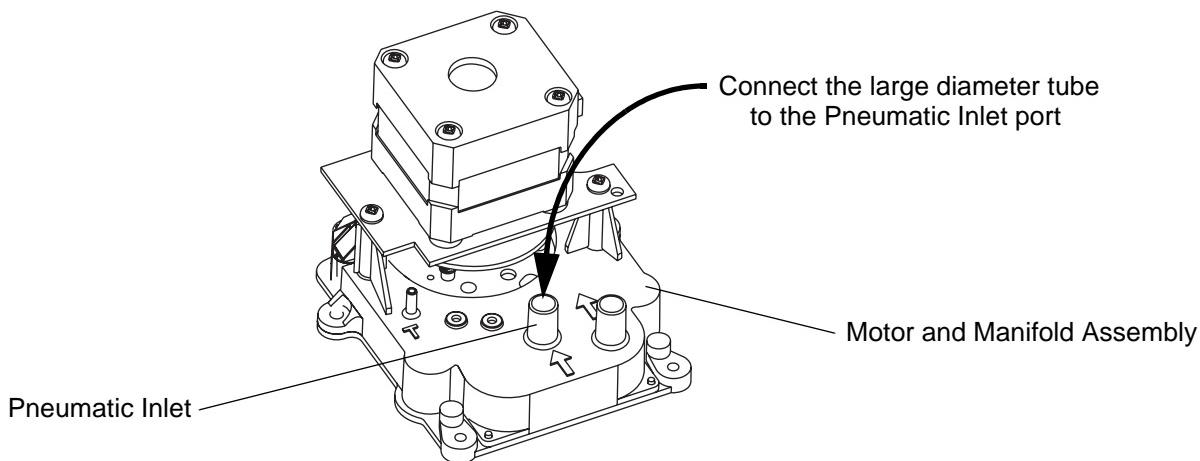


Figure 41 - Pneumatic Inlet on the Motor and Manifold Assembly

## 16 Replacing the Mains/Power Fuses on the Power Supply PCB Assembly

**WARNING: MAKE SURE THE REPLACEMENT FUSES ARE THE CORRECT TYPE AND RATING, OR THE ELECTRICAL SAFETY OF THE PUMP MAY BE IMPAIRED.**

**Note:** Always replace both fuses even if only one has "blown".

- 16.1 Remove the rear case from the pump (Refer to Page 13, Section 10).
- 16.2 Un-clip the plastic cover on one of the fuseholders, and remove the fuse (Fig 42, Item 10).
- 16.3 Install the new fuse (Fig 42, Item 10) into the fuseholder, and clip the plastic cover onto the fuseholder.
- 16.4 Repeat for the second fuse (Fig 42, Item 10).
- 16.5 Install the rear case onto the pump (Refer to Page 13, Section 11).

## 17 Replacing the Air Inlet Filter on the Compressor Assembly

- 17.1 Remove the rear case from the pump (Refer to Page 13, Section 10).
- 17.2 Using a pair of tweezers, remove the air inlet filter (Fig 42, Item 20) from the air inlet filter holder (Fig 42, Item 30).
- 17.3 Push the new air inlet filter (Fig 42, Item 20) fully into the air inlet filter holder.
- 17.4 Install the rear case onto the pump (Refer to Page 13, Section 11).

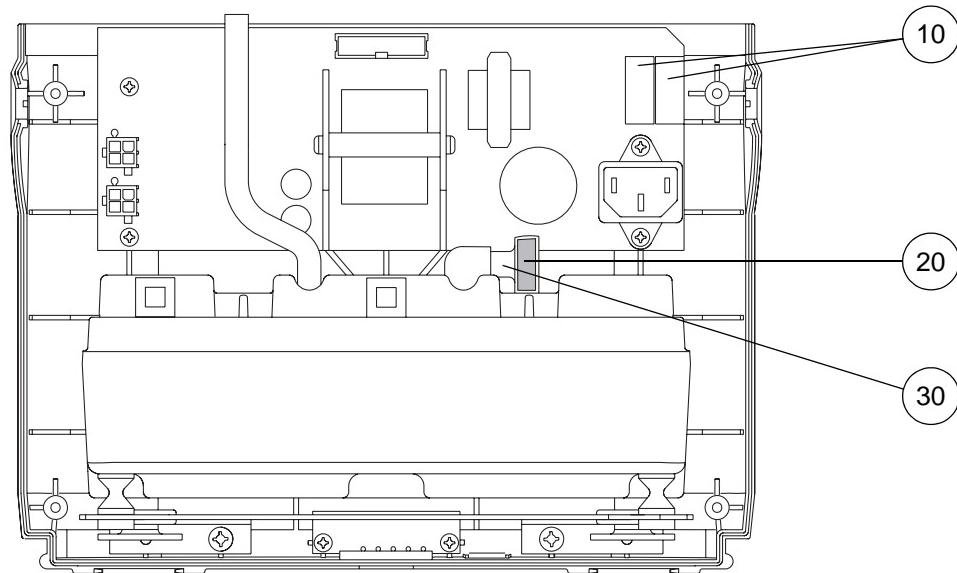
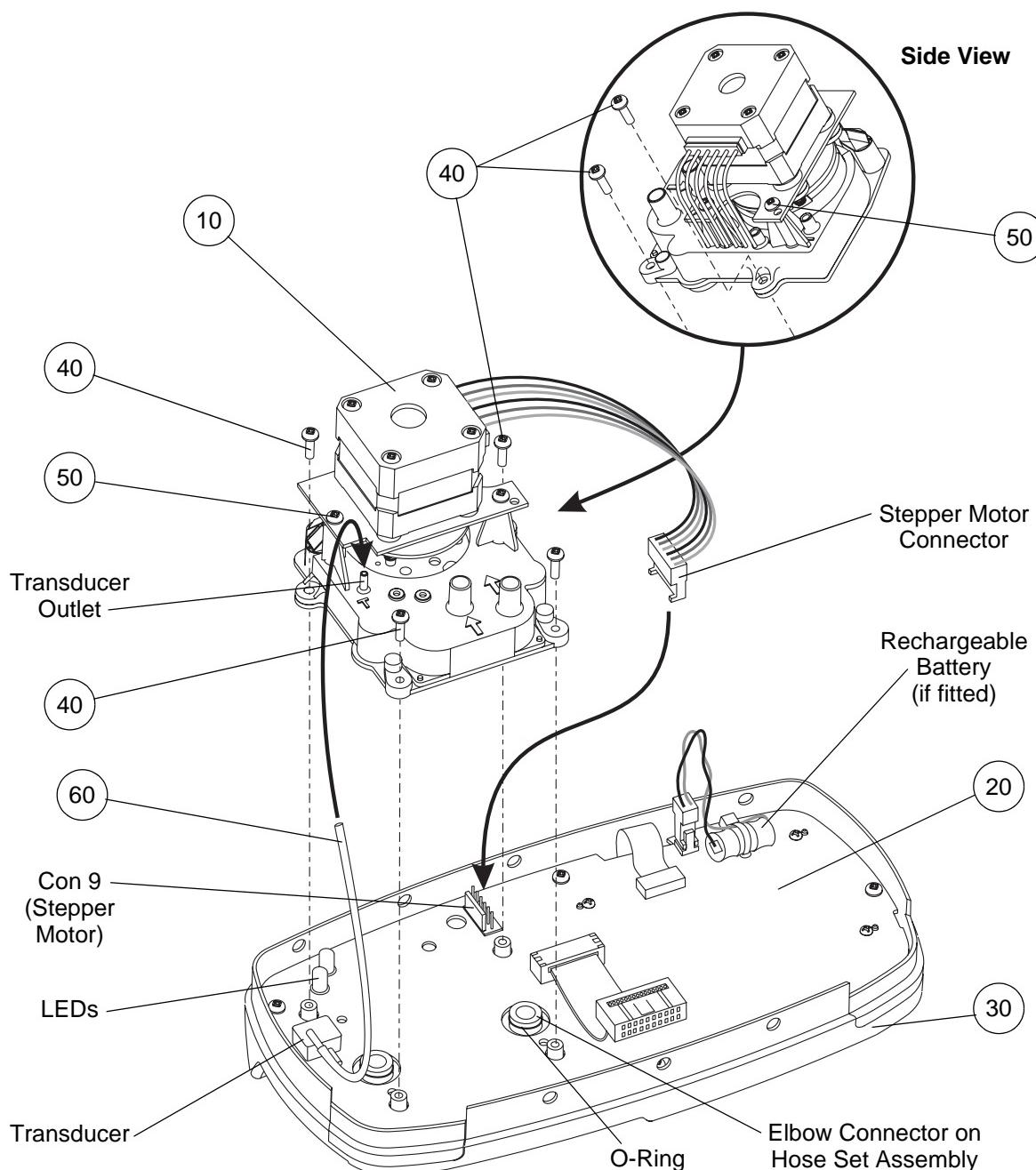


Figure 42 - Replacing the Mains/Power Fuses and Compressor Air Inlet Filter

Table 13 - Mains/Power Fuse and Compressor Air Inlet Filter Parts List

Item	Part Number	Description	Qty
10	507422	Fuse, 3.15A 20mm Type T, Spares Item	2
20	509317	Air Inlet Filter, Compressor Assembly	1
30	509320	Air Inlet Filter Holder	1



**Figure 43 - Replacing the Motor and Manifold Assembly**

**Table 14 - Motor and Manifold Assembly Parts List**

Item	Part Number	Description	Qty
10	507420	Motor and Manifold Assembly, Spares Item	1
20	REF	Control PCB Assembly, Spares Item	1
30	507421	Top Case Assy, with Window & Membrane Label, Spares Item	1
40	FAS223	Screw, 3 dia x 10 Pan Head	4
50	FAS223	Screw, 3 dia x 10 Pan Head	3
60	507494	Transducer Tube	1

## 18 Removing the Motor and Manifold Assembly

**CAUTION:** *Electrostatic discharge can seriously damage the control PCB assembly. Adequate earthing/grounding precautions must be taken when handling it.*

**Note:** *It is not necessary to remove the hose set assemblies from the pump in order to replace the motor and manifold assembly.*

- 18.1 Separate the top case assembly from the front case (Refer to Page 15, Section 14).
- 18.2 Disconnect the stepper motor connector from the control PCB assembly (Fig 43, PCB Con 9).
- 18.3 Disconnect the small diameter transducer tube from the transducer on the motor and manifold assembly (Fig 43, Item 10).

**CAUTION:** *Do not disconnect the transducer tube from the transducer on the control PCB assembly. The transducer is a sensitive device and is easily damaged.*

- 18.4 Remove the four screws (Fig 43, Item 40), and carefully lift the motor and manifold assembly from the control PCB and top case assemblies (Fig 43, Items 20 and 30).

**Note:** *If the hose set assemblies are still connected to the top case assembly, the motor and manifold assembly will be a tight fit on the elbow connectors on the hose sets.*

**Note:** *Do not loosen or remove the three screws (Fig 43, Item 50) which secure the stepper motor to the manifold.*

## 19 Repairing the Motor and Manifold Assembly

- 19.1 Only carry out the actions in this section if BOTH of the following criteria are true:
  - The serial number of the pump is LESS than that detailed in Para 19.3 (below).
  - The pump exhibits any of the problems detailed in Refer to Page 20, Section 19.4.
- 19.2 Flowtron Universal Pump Part Numbers affected:

507001	Flowtron Universal Pump, UK / Saudi Arabia
507003	Flowtron Universal Pump, USA / Canada
507004DE	Flowtron Universal Pump, Germany
507004FR	Flowtron Universal Pump, France
507004IT	Flowtron Universal Pump, Italy
507004NL	Flowtron Universal Pump, Netherlands / Belgium
507009AU	Flowtron Universal Pump, Australia / New Zealand
507009ZA	Flowtron Universal Pump, South Africa / India

- 19.3 Flowtron Universal Pump Serial Numbers affected:

Serial numbers LESS than:	507025900
---------------------------	-----------

**Note:** *All pumps from serial number 507025900 onwards have been built with the modified motor and manifold assembly fitted.*

#### 19.4 Reason for the repair

As the rotor turns inside the motor and manifold assembly (in the pump), the rotor rubs against the module assembly, creating plastic dust. This dust can accumulate inside the motor and manifold assembly in two critical areas:

- The silver positioning strip on the rotor. This can result in the loss of positional synchronisation of the rotor.
- The centre pivot area of the rotor. This can increase friction and cause the rotor to stall.

These two conditions will cause the pump to fail, and then the pump will usually display either of the following fault messages on the LCD screen.

- **Pump Fault - Step** alarm.
- **LO** (Low Pressure) alarm.

To repair the pump, proceed as follows:

19.5 Remove and disassemble the motor and manifold assembly (507111).

19.6 Discard the old rotor, stator and module sub-assemblies.

19.7 Reassemble the motor and manifold assembly using the following new parts:

19.7.1 507124, Pinned Rotor Assembly.

19.7.2 507125, Module and Stator Subassembly.

**Note:** All other parts in the motor and manifold assembly are re-used.

19.8 Re-install the motor and manifold assembly into the pump.

19.9 Replace the small-diameter transducer tube (between the motor and manifold assembly and the control PCB assembly) with a new longer tube, since the pressure outlet is in a different position on the new manifold assembly.

#### Spare Parts List

The following new spare part assemblies are required:

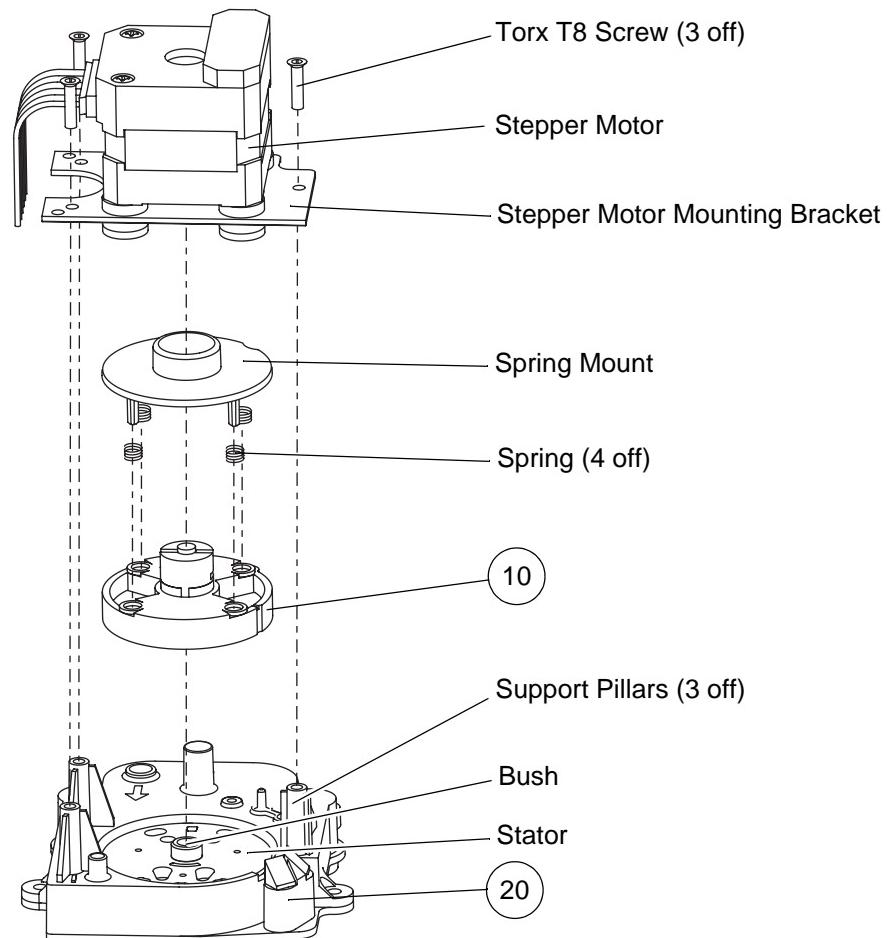
**Note:** These spare parts are fully assembled and ready to install.

Part No.	Description	Qty
507124	Pinned Rotor Assembly (Spares)	1
507125	Module and Stator Sub-Assembly (Spares) (includes Silicone Tube 1.5 ID, 3.5 OD, 160 mm long)	1

19.10 Remove the motor and manifold assembly from the pump (Chapter 5, Page 19, Section 18).

19.11 Remove the old transducer tube from the motor and manifold assembly and the control PCB assembly, and discard it.

19.12 Put the motor and manifold assembly on a flat surface, and using a Torx T8 screwdriver, remove the three screws which secure the stepper motor mounting bracket to the old module and stator sub-assembly (refer to Figure 44).



**Figure 44 - Replacing the Motor and Manifold Sub-Assemblies**

**Table 15 - Motor and Manifold Sub-Assemblies**

Item	Part Number	Description	Qty
10	507124	Pinned Rotor Assembly (Spares)	1
20	507125	Module and Stator Sub-Assembly (Spares) (includes 507494)	1
	507494	Silicone Tube 1.5mm ID, 3.5mm OD, 160mm long (part of 507125)	1

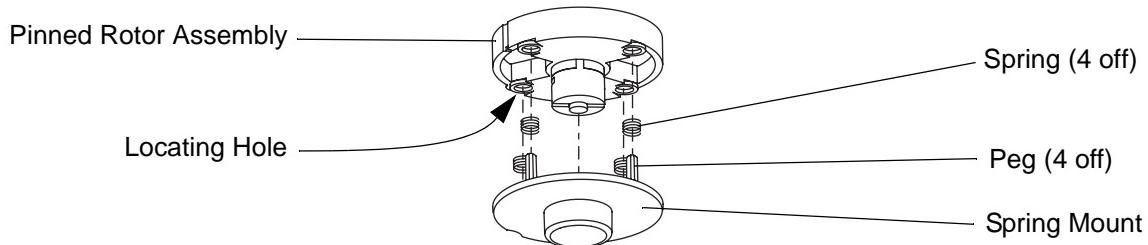
- 19.13 Hold the spring mount down, and lift the stepper motor and mounting bracket off the spring mount and module and stator sub-assembly.
- 19.14 Lightly press the spring mount and old pinned rotor assembly together, so that the four springs are retained between them, and do the following:
- 19.14.1 Lift them off the module and stator sub-assembly.
  - 19.14.2 Turn them over and place them on a flat surface, so that the pinned rotor assembly is on top.

**Note:** *It will be easier to disassemble and re-assemble the components if the pinned rotor assembly is on top.*

19.15 Carefully lift the pinned rotor assembly off the spring mount (refer to Figure 45).

**Note:** Make sure you do not lose any of the four springs.

19.16 Discard the old pinned rotor assembly and old module and stator sub-assembly.



**Figure 45 - Assembling Springs to Rotor and Spring Mount**

19.17 Make sure the spring mount is on a flat surface, with the four pegs and springs on top (refer to Figure 45).

**Note:** Make sure the four springs are still located on the pegs.

19.18 Turn the new pinned rotor assembly (Table 15, Item 10) so that the four locating holes are on the underside (refer to Figure 45).

19.19 Lower the pinned rotor assembly down onto the spring mount, making sure that the four pegs and springs on the spring mount are located in the four locating holes in the pinned rotor assembly.

19.20 Lightly press the spring mount and new pinned rotor assembly together, so that the four springs are retained between them, and do the following (refer to Figure 44):

19.20.1 Turn them over so that the spring mount is on top.

19.20.2 Place the spring mount and pinned rotor assembly onto the stator on the module and stator sub-assembly (Table 15, Item 20).

**Note:** Make sure the hole in the centre of the pinned rotor assembly is located over the bush in the centre of the stator.

19.20.3 With the orientation of the module and stator sub-assembly as shown in Figure 46, turn the spring mount and pinned rotor assembly round so that the slot in the drive dog is in the approximate "East-West" position shown.

**Note:** This alignment is necessary so that the stepper motor drive shaft can be assembled onto the pinned rotor assembly (refer to Para 19.24, below).

19.21 Carefully release your pressure on the spring mount.

**Note:** Make sure that the four springs do not push the spring mount up and off of the pinned rotor assembly!

19.22 Put the stepper motor and mounting bracket on a flat surface, with the drive shaft on top.

19.23 With the orientation of the stepper motor mounting bracket as shown in Figure 46, turn the stepper motor drive shaft round so that the pin in the end of the drive shaft is in the approximate "East-West" position shown.

19.24 Assemble the stepper motor and mounting bracket onto the spring mount and the module and stator sub-assembly, as follows (refer to Figures 44 and 46):

19.24.1 Turn the stepper motor and mounting bracket back over so that the drive shaft is on the underside, and put it onto the top of the spring mount, module and stator sub-assembly.

- 19.24.2 Press the two parts firmly together, so that the pin on the drive shaft engages in the slot in the drive dog. The stepper motor mounting bracket should then rest on top of the three support pillars on the module and stator sub-assembly.

**Note:** If necessary, turn the spring mount and pinned rotor assembly forward and back a small amount to make sure the pin engages in the slot.

- 19.24.3 Using a Torx T8 screwdriver, install the three screws to secure the stepper motor mounting bracket to the module and stator sub-assembly (refer to Figure 44).

- 19.25 Install the motor and manifold assembly into the pump (Refer to Page 20, Section 19.8). To install the new longer transducer tube (Table 15, Item 30), use the following procedure (refer to Figure 47):

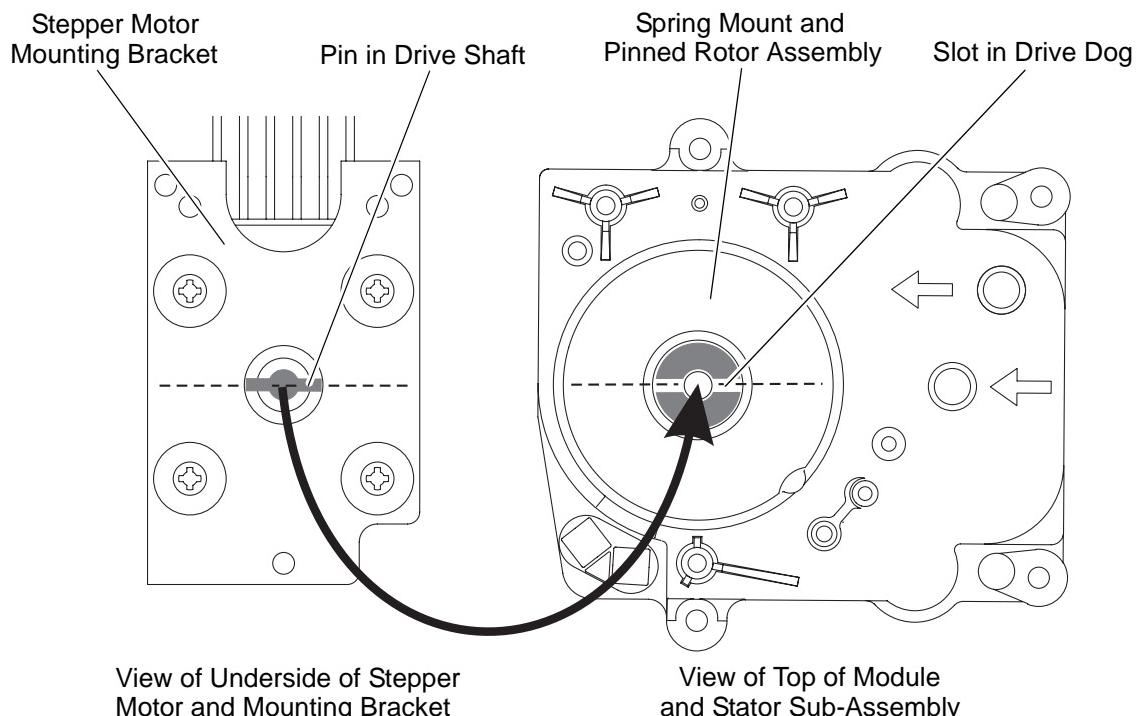
- 19.25.1 Push one end of the transducer tube fully onto the transducer outlet on the motor and manifold assembly.

**Note:** The transducer outlet on the new module and stator sub-assembly is in a different position.

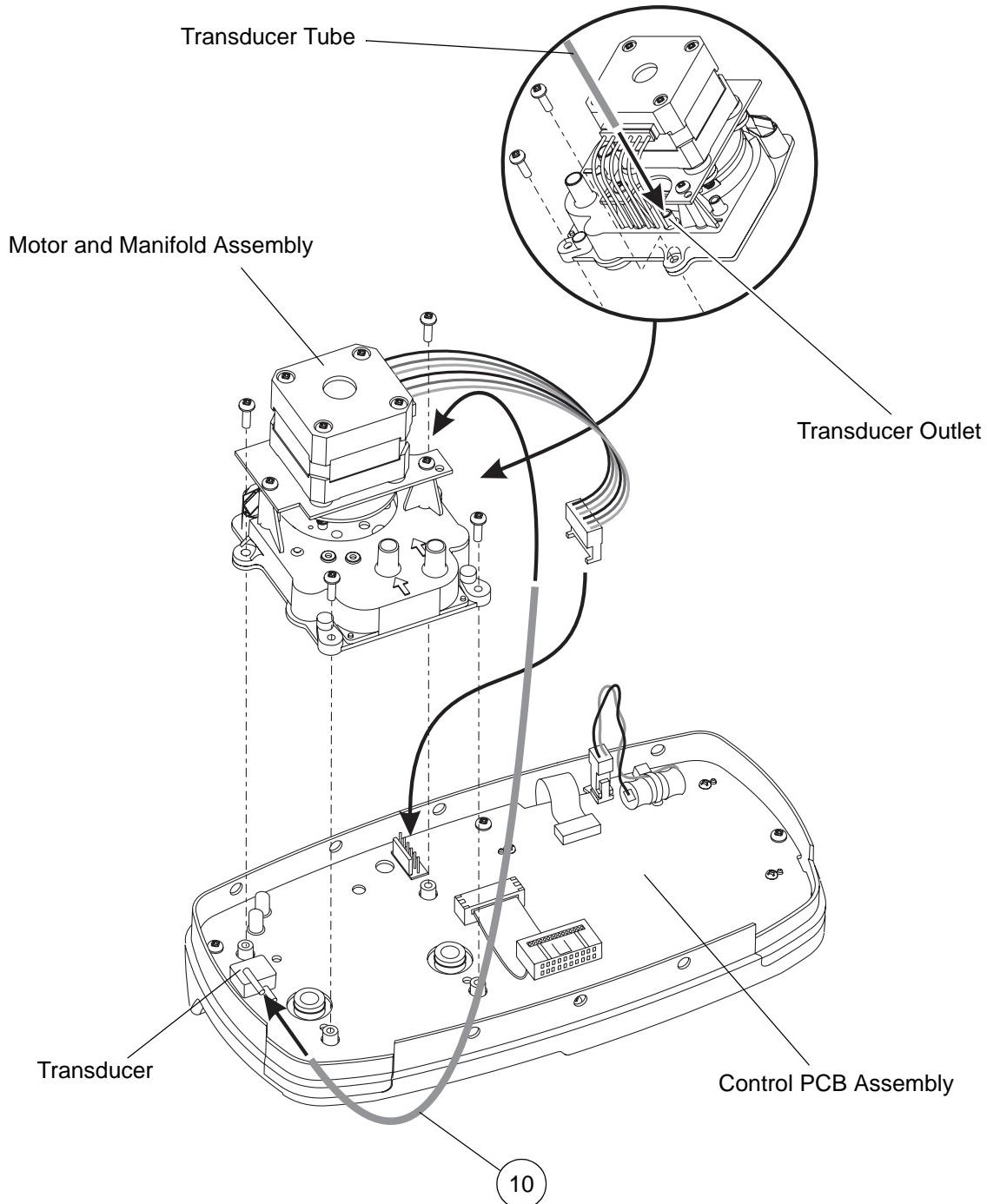
- 19.25.2 Push the other end of the transducer tube onto the top outlet of the transducer on the control PCB assembly.

**CAUTION:** Do not handle the transducer on the control PCB assembly unnecessarily. The transducer is a sensitive device. To avoid damage, put your finger at the back of the transducer while you carefully push the tube onto the top outlet at the front of the transducer.

**Note:** Make sure the transducer tube is not kinked.



**Figure 46 - Aligning the Stepper Motor Drive Shaft and Pinned Rotor Assembly**



**Figure 47 - Installing the New Longer Transducer Tube**

**Table 16 - Long Transducer Tube Parts List**

Item	Part Number	Description	Qty
10	507494	Silicone Tube, 1.5 mm ID, 3.5 mm OD, 160 mm Long	1

## 20 Installing the Motor and Manifold Assembly

- 20.1 If the hose set assemblies were not removed, make sure that the O-ring is correctly installed on each hose set elbow connector (Refer to Figure 43).
- 20.2 Make sure the two LEDs (adjacent to the transducer) are vertical on the control PCB assembly, and have not been knocked or moved during the removal procedure (Refer to Figure 43).
- 20.3 Carefully install the motor and manifold assembly (Fig 43, Item 10) onto the control PCB and top case assemblies (Fig 43, Items 20 and 30).
 

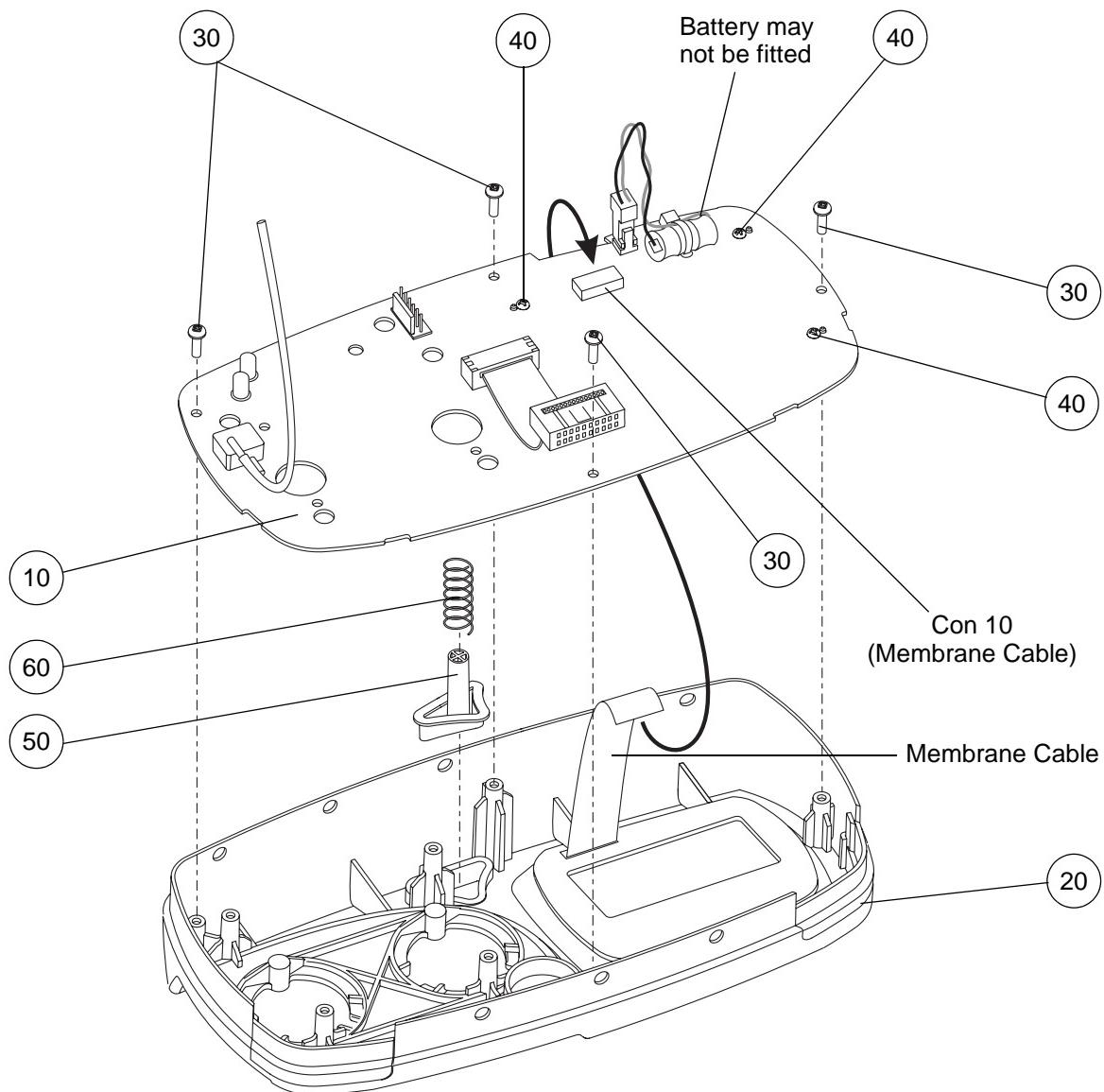
**Note:** *If the hose set assemblies are still connected to the top case assembly, the motor and manifold assembly will be a tight fit on the elbow connectors on the hose sets.*
- 20.4 Install the four screws (Fig 43, Item 40) to secure the motor and manifold assembly.
- 20.5 Connect one end of the longer transducer tube (Item 60) onto the transducer outlet on the motor and manifold assembly (Fig 43, Item 10).
- 20.6 Connect the other end of the longer transducer tube (Item 60) onto the top outlet on the transducer on the control PCB assembly (Refer to Figure 43).

**CAUTION:** *Do not handle the transducer on the control PCB assembly unnecessarily. The transducer is a sensitive device. To avoid damage, put your finger at the back of the transducer while you push the tube onto the top outlet at the front of the transducer.*

- 20.7 Connect the stepper motor connector onto the control PCB assembly (Fig 43, PCB Con 9).
- 20.8 Install the top case assembly onto the front case (Refer to Page 16, Section 15).
- 20.9 If the hose set assemblies were removed from the pump, then inspect and install new or the original hose set assemblies (Refer to Page 10, Section 9).

## 21 Including a Longer Transducer Tube on the Motor and Manifold Assembly

- 21.1 Originally the transducer tube was part of the control PCB assembly. The pressure outlet is in a different position on the new, modified motor and manifold assembly, 507420. Therefore, if a new motor and manifold assembly is installed, the short transducer tube must be replaced by the new longer transducer tube, 507494.
- 21.2 Refer to Figure 47 and Table 17, which detail the longer tube.
- 21.3 To remove the motor and manifold assembly (spares item 507420), carry out the procedure detailed in Chapter 5, Page 19, Section 18, with the following changes:
  - 21.3.1 Instead of paragraph Chapter 5, Page 19, Section 18.3, follow this instruction:  
*Disconnect the small diameter transducer tube from the transducer on the control PCB assembly.*
  - 21.3.2 Ignore the **CAUTION** after Chapter 5, Page 19, Section 18.3.
- 21.4 To install the motor and manifold assembly spares item, 507420, carry out the procedure detailed in Chapter 5, Page 25, Section 20, with the following changes:
  - 21.4.1 Instead of paragraph Chapter 5, Page 25, Section 20.5, follow this instruction:  
*Connect one end of the longer transducer tube (Fig 47, Item 10) onto the transducer outlet on the motor and manifold assembly.*
  - 21.4.2 Instead of paragraph Chapter 5, Page 25, Section 20.6, follow this instruction:  
*Connect the other end of the longer transducer tube (Fig 47, Item 10) onto the top outlet on the transducer on the control PCB assembly.*
  - 21.4.3 Observe the **CAUTION** after Chapter 5, Page 25, Section 20.6.



**Figure 48 - Replacing the Control PCB and Run Button**

**Table 17 - Control PCB and Run Button Parts List**

Item	Part Number	Description	Qty
10	REF	Control PCB Assembly, Spares Item	1
20	507421	Top Case Assy, with Window & Membrane Label, Spares Item	1
30	FAS223	Screw, 3 dia x 10 Pan Head	4
40	REF	Screw, 2.5mm x 8 Pan Head	4
50	507305	Run Button	1
60	507411	Button Return Spring	1

## 22 PCB Part Numbers

- 22.1 The software for the new control board has been up-issued to V6.0026 or higher to run on the new control PCB assembly. This new software version includes all available languages which can be selected from the options menu.

**Table 18 - Old and New PCB Part Numbers**

Old Part No.	New Part No.	Description
507058	507137	Power Supply PCB Assembly
507061	507131	Control PCB Assembly

## 23 Interchangeability of PCBs

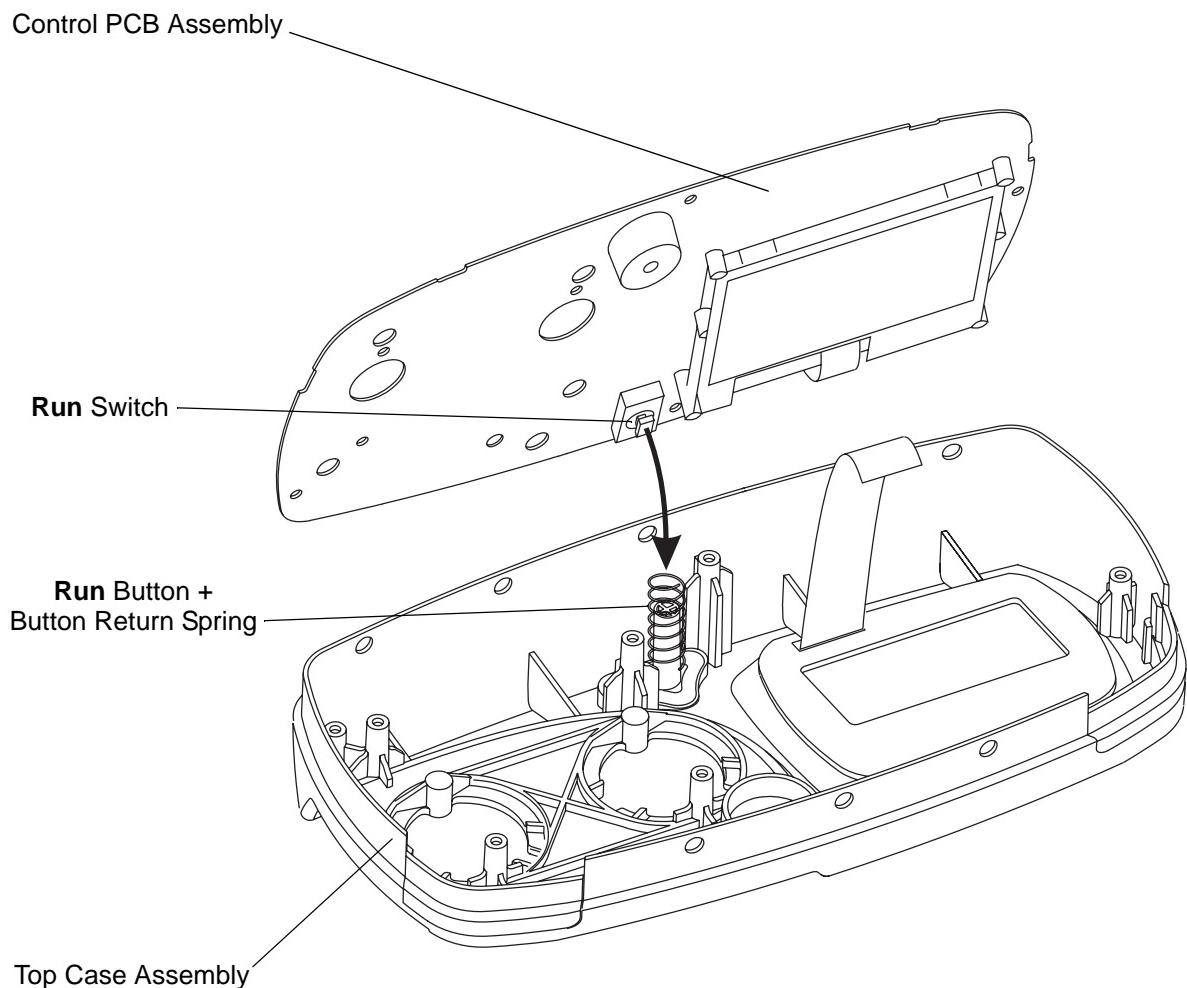
### 23.1 PCB Assemblies

- 23.1.1 The NEW control PCB Assembly can only be used with the NEW Power Supply PCB Assembly. The NEW PCB assemblies MUST NOT be mixed with the OLD assemblies.
- 23.1.2 When the 507061 Control PCB is no longer available it can be replaced with 507131 but the Power Supply MUST also be changed to a 507137.

### 23.2 Software Versions

- 23.2.1 OLD Control PCB assemblies (507061) are only compatible with software versions up to and including V3.001. NEW Control Boards (507131) are only compatible with software versions from V6.0026.

**Note:** *Do not attempt to install incompatible software on OLD or NEW boards as this may cause damage to the PCB assembly.*



**Figure 49 - Installing the Control PCB Assembly**

## 24 Removing the Control Printed Circuit Board (PCB) Assembly

**CAUTION:** *Electrostatic discharge can seriously damage the control PCB assembly. Adequate earthing/grounding precautions must be taken when handling it.*

- 24.1 Remove the hose set assemblies (Refer to Page 9, Section 8).
- 24.2 Remove the motor and manifold assembly from the control PCB assembly (Refer to Page 19, Section 18).
- 24.3 Carefully pull the membrane cable out of the membrane connector on the control PCB assembly (Fig 48, PCB Con 10).
- 24.4 Remove the four screws (Fig 48, Item 30), and lift the control PCB assembly (Fig 48, Item 10) out of the top case assembly (Fig 48, Item 20).

**Note:** *Do not remove the four smaller screws (Fig 48, Item 40) which secure the LCD display to the control PCB assembly.*

## 25 Installing the Control Printed Circuit Board (PCB) Assembly

- 25.1 Put the top case assembly (Fig 48, Item 20) on a horizontal surface, with the inside surface pointing upwards, and position the control PCB assembly (Fig 48, Item 10) just above it.
- 25.2 Carefully push the membrane cable into the membrane connector on the control PCB assembly (Fig 48, PCB Con 10).
- 25.3 Make sure the **Run** button (Fig 48, Item 50) is installed into the cutout in the top case assembly, and the button return spring (Fig 48, Item 60) is installed on the **Run** button.
- 25.4 Lower the control PCB assembly onto the four pillars in the top case assembly.

**Note:** *Make sure the membrane cable is positioned in the cutout in the control PCB assembly.*

**Note:** *As the control PCB assembly is lowered onto the top case assembly, make sure the **Run** switch on the control PCB assembly stays in the centre of the button return spring on the top case assembly (Refer to Figure 49).*

- 25.5 Install the four screws (Fig 48, Item 30) to secure the control PCB assembly.
- 25.6 Install the motor and manifold assembly onto the control PCB assembly, and back into the pump (Refer to Page 25, Section 20).
- 25.7 Install the hose set assemblies (Refer to Page 10, Section 9).

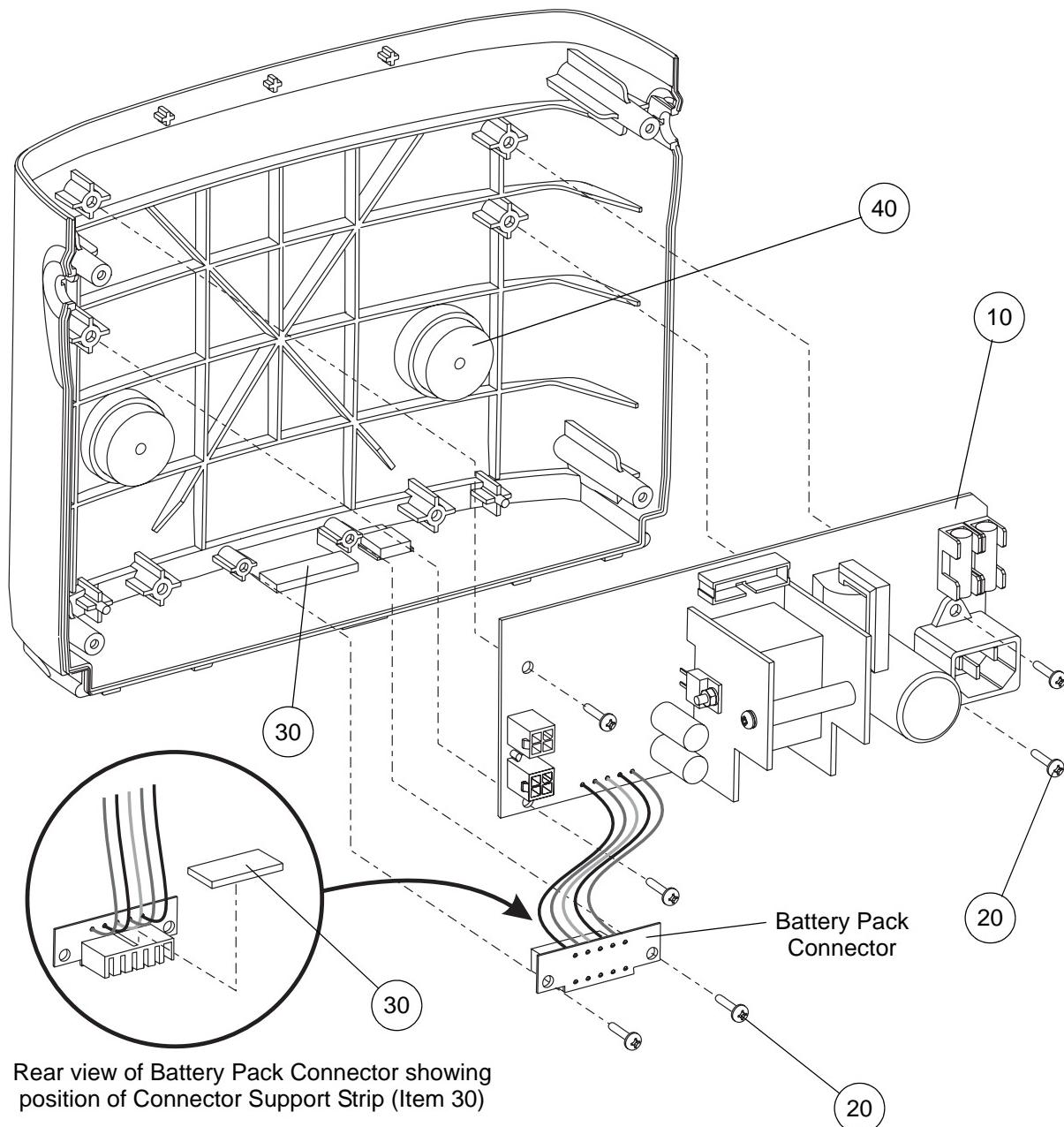


Figure 50 - Replacing the Power Supply PCB Assembly

Table 19 - Power Supply PCB Assembly Parts List

Item	Part Number	Description	Qty
10	REF	Power Supply PCB Assembly, Spares Item	1
20	FAS223	Screw, 3 dia x 10 Pan Head	6
30	507410	Connector Sealing Strip	2
40	BP027	Compressor Support Rubber	2

## 26 Removing the Power Supply PCB (Printed Circuit Board) Assembly

**WARNING: DO NOT CONNECT THE MAINS/POWER CORDSET TO THE POWER SUPPLY PCB ASSEMBLY, AND SWITCH ON THE MAINS/POWER SUPPLY, WHEN THE REAR CASE IS REMOVED FROM THE PUMP. VOLTAGES IN EXCESS OF 30 VOLTS RMS OR 50 VOLTS DC ARE PRESENT ON THE POWER SUPPLY PCB ASSEMBLY AND CAN, IN CERTAIN CIRCUMSTANCES, BE LETHAL.**

**CAUTION: Electrostatic discharge can seriously damage the power supply PCB assembly. Adequate earthing/grounding precautions must be taken when handling it.**

**Note:** The power supply PCB assembly includes the battery pack connector, which is hard-wired to it.

- 26.1 Separate the top case assembly from the front case (Refer to Page 15, Section 14).
- 26.2 Remove the compressor assembly and mounting bracket from the pump (Refer to Page 43, Section 36).
- 26.3 Remove the two screws (Fig 50, Item 20) and the battery pack connector from the front case.
- 26.4 Remove the four screws (Fig 50, Item 20) and the power supply PCB assembly (Fig 50, Item 10) from the front case.

## 27 Installing the Power Supply PCB (Printed Circuit Board) Assembly

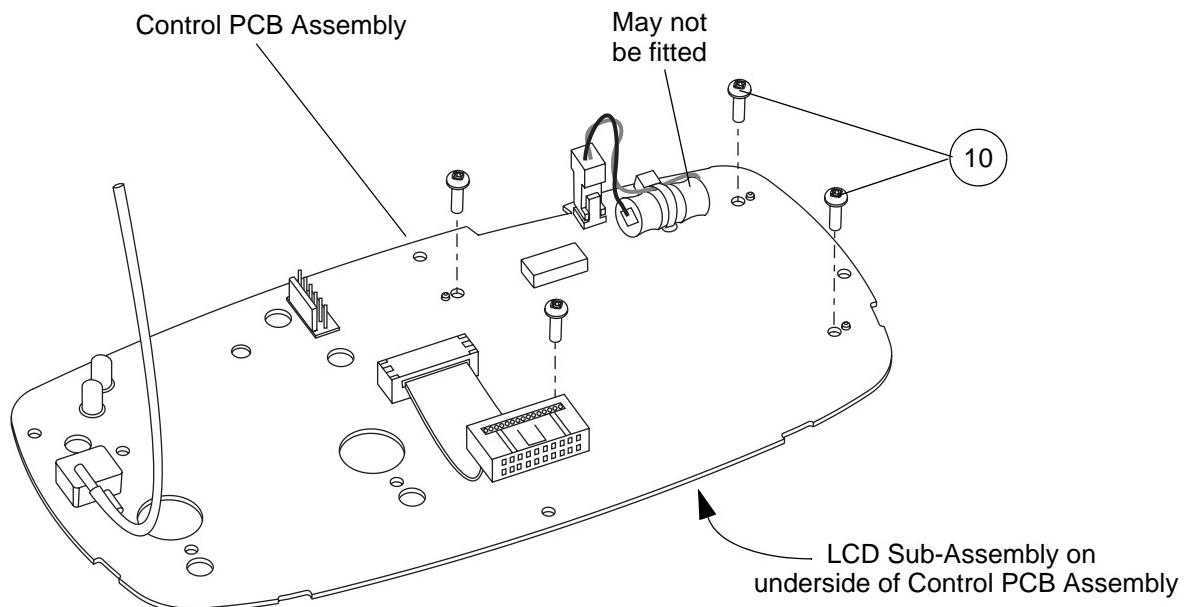
**WARNING: DO NOT CONNECT THE MAINS/POWER CORDSET TO THE POWER SUPPLY PCB ASSEMBLY, AND SWITCH ON THE MAINS/POWER SUPPLY, WHEN THE REAR CASE IS REMOVED FROM THE PUMP. VOLTAGES IN EXCESS OF 30 VOLTS RMS OR 50 VOLTS DC ARE PRESENT ON THE POWER SUPPLY PCB ASSEMBLY AND CAN, IN CERTAIN CIRCUMSTANCES, BE LETHAL.**

- 27.1 Put the power supply PCB assembly (Fig 50, Item 10) onto the front case, and install the four screws (Fig 50, Item 20) to secure it.
- 27.2 If a new power supply PCB assembly is being installed, stick a new connector sealing strip (Fig 50, Item 30) to the back of the battery pack connector. If the original power supply PCB assembly is being re-installed, make sure the connector sealing strip is still stuck to the back of the battery pack connector (Refer to Figure 50).
- 27.3 Make sure there is a second connector sealing strip stuck to the front case, adjacent to the battery pack connector slot.
- 27.4 Insert the battery pack connector into the slot in the front case, and install the two screws (Fig 50, Item 20) to secure it.

**Note:** Make sure the wires from the power supply PCB assembly to the battery pack connector do not lie on top of the circular compressor support rubbers (Fig 50, Item 40).

- 27.5 Install the compressor assembly and mounting bracket into the pump (Refer to Page 43, Section 37).

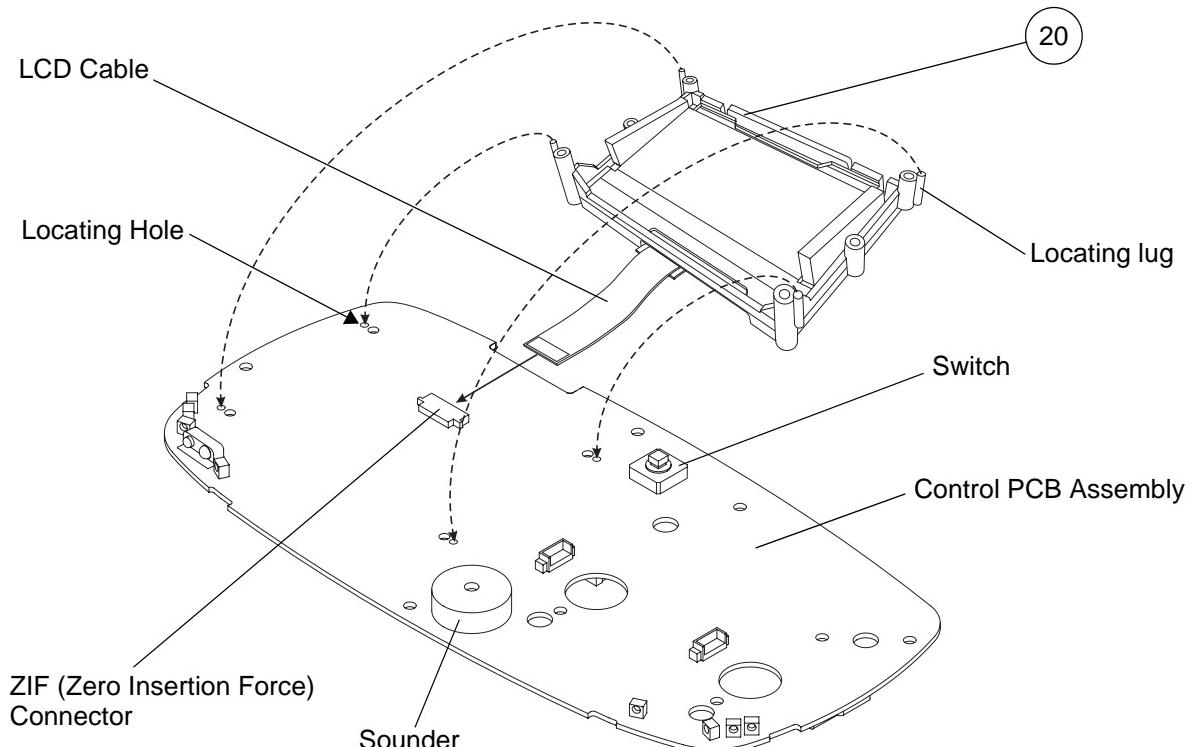
Install the top case assembly onto the front case (Refer to Page 16, Section 15).



**Figure 51 - Removing the LCD Sub-Assembly Screws from the Control PCB Assembly**

**Table 20 - LCD Sub-Assembly Parts List**

Item	Part Number	Description	Qty
10	FAS240	Screw, 2.5mm x 8mm PT	4
20	507126	LCD Sub-Assembly (Spares) (includes LCD Graphic Module, Holder, Diffuser and Spacer)	



**Figure 52 - Installing the LCD Sub-Assembly onto the Control PCB Assembly**

## 28 Removing the LCD Sub-Assembly

### Removing the Control PCB Assembly from the Top Case Assembly

- 28.1 Remove the complete control PCB assembly (including the LCD sub-assembly) from the top case assembly, as follows (refer to Chapter 5, Page 29, Section 24):
  - 28.1.1 Remove the hoseset assemblies from the pump.
  - 28.1.2 Separate the top case assembly from the front case assembly.
  - 28.1.3 Remove the motor and manifold assembly from the control PCB assembly.
  - 28.1.4 Remove the membrane cable from the membrane connector on the control PCB assembly.
  - 28.1.5 Remove the four screws, and remove the complete control PCB assembly (including the LCD sub-assembly) from the top case assembly.

### Removing the LCD Sub-Assembly from the Control PCB Assembly

- 28.2 If the membrane label on the top case assembly is to be replaced, carry out the procedure detailed in Chapter 5, Page 36, Section .
- 28.3 Put the complete control PCB assembly on a flat surface, so that the LCD (Fig 52, Item 20) sub-assembly is on the underside (refer to Figure 51).
 

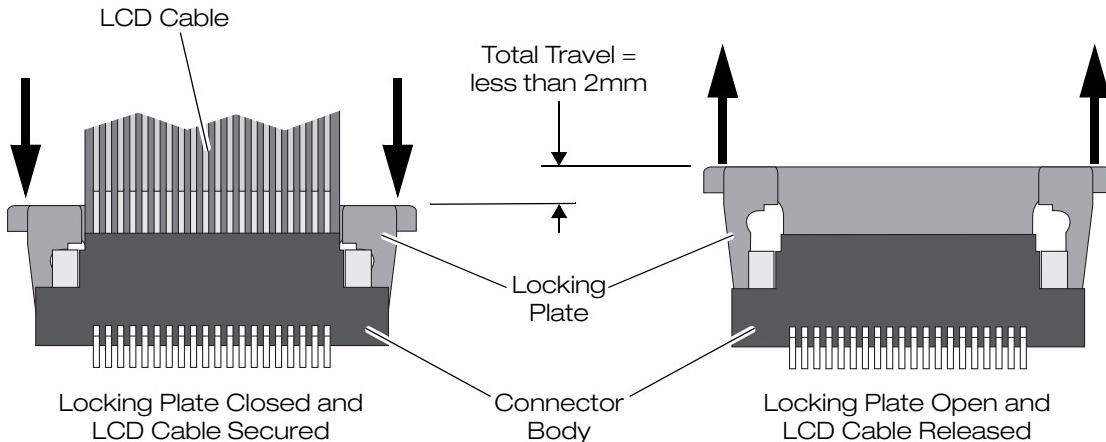
**Note:** If the LCD sub-assembly is to be re-used, make sure the outer face of the LCD sub-assembly is protected from damage.
- 28.4 Remove the four screws (Fig 51, Item 10) which secure the LCD sub-assembly to the control PCB assembly. Retain the screws for the installation procedure.
 

**Note:** Do NOT separate the LCD sub-assembly from the control PCB assembly. They are still connected together via the short LCD cable.

**Table 21 - LCD Spare Part Numbers**

Part No.	Description	Qty
507126	LCD Sub-Assembly (Spares) (includes LCD Graphic Module, Holder, Diffuser and Spacer) <sup>(a)</sup>	1
507397	Top Case Membrane Label	1

- a. The LCD Sub-Assembly is fully assembled and ready to install.



**Figure 53 - ZIF (Zero Insertion Force) Socket**

- 28.5 Hold the LCD sub-assembly in position on the control PCB assembly, and turn the complete control PCB assembly over so that the LCD sub-assembly is on top.
- 28.6 Carefully lift the LCD sub-assembly off the control PCB assembly, and rotate it in the direction of the LCD cable, until it is lying on a flat surface adjacent to the edge of the control PCB assembly (refer to Figure 52).

**CAUTION:** *Do NOT attempt to pull the LCD cable out of the connector on the control PCB assembly, or you could damage the cable and the connector. This is a ZIF (zero insertion force) connector, which must be “unlocked” before the cable can be removed.*

- 28.7 To remove the LCD cable from the ZIF socket on the control PCB assembly, do the following (refer to Figures 52 and 53):
  - 28.7.1 Using your thumbnails, or a small tool which will not damage the ZIF socket, gently push the outer edges of the locking plate away from the connector body on the ZIF socket, until the locking plate is in the fully open position (fully extended). The LCD cable is now released.  
*Note: The total travel of the locking plate is less than 2mm.*
  - 28.7.2 Remove the LCD cable from the ZIF connector, and remove the LCD sub-assembly.

## 29 Installing the LCD Sub-Assembly

### Installing the LCD Sub-Assembly onto the Control PCB Assembly

- 29.1 Position the new LCD sub-assembly (Fig 52, Item 20) by the side of the control PCB assembly, as follows:
  - 29.1.1 Put both assemblies on a flat surface (refer to Figure 52):
  - 29.1.2 The ZIF socket should be on the top side of the control PCB assembly.
  - 29.1.3 The four locating lugs should be on the top side of the LCD sub-assembly.

**Note:** *Make sure the outer face, on the underside of the LCD sub-assembly, is protected from damage.*
- 29.1.4 Ensure the orientation of both assemblies is as shown in Figure 52. The LCD cable should be adjacent and “pointing” towards the ZIF socket.

- 29.1.5 Raise the LCD sub-assembly by 15-20mm (so that it is at a similar height to the control PCB assembly) and support it in this position. This will make it easier to connect the *short* LCD cable to the ZIF socket on the control PCB assembly.
- 29.2 To connect the LCD cable (on the new LCD sub-assembly) to the ZIF socket on the control PCB assembly, do the following (refer to Figures 52 and 53):
  - 29.2.1 Make sure the locking plate on the ZIF socket is still in the fully open position (fully extended).
  - 29.2.2 Insert the end of the LCD cable fully into the ZIF socket.
 

**Note:** *Less than 2mm of the LCD cable can be inserted into the ZIF socket.*

**Note:** *Make sure the LCD sub-assembly and control PCB assembly do not move, so that the LCD cable remains in the ZIF socket.*
  - 29.2.3 Using your thumbnails, or a small tool which will not damage the ZIF socket, gently push the outer edges of the locking plate into the connector body on the ZIF socket, until the locking plate is in the closed position (fully retracted).
  - 29.2.4 The LCD cable is now secured in the ZIF connector.
- 29.3 Carefully rotate the LCD sub-assembly onto the control PCB assembly, and put the four locating lugs in the LCD sub-assembly into the corresponding holes in the control PCB assembly (refer to Figure 52).
- 29.4 Hold the LCD sub-assembly in position on the control PCB assembly, and turn the complete control PCB assembly over so that the LCD sub-assembly is on the underside (refer to Figure 51).
 

**Note:** *Make sure the outer face, on the underside of the LCD sub-assembly, is protected from damage.*
- 29.5 Install the four screws (Fig 51, Item 10) to secure the LCD sub-assembly to the control PCB assembly.

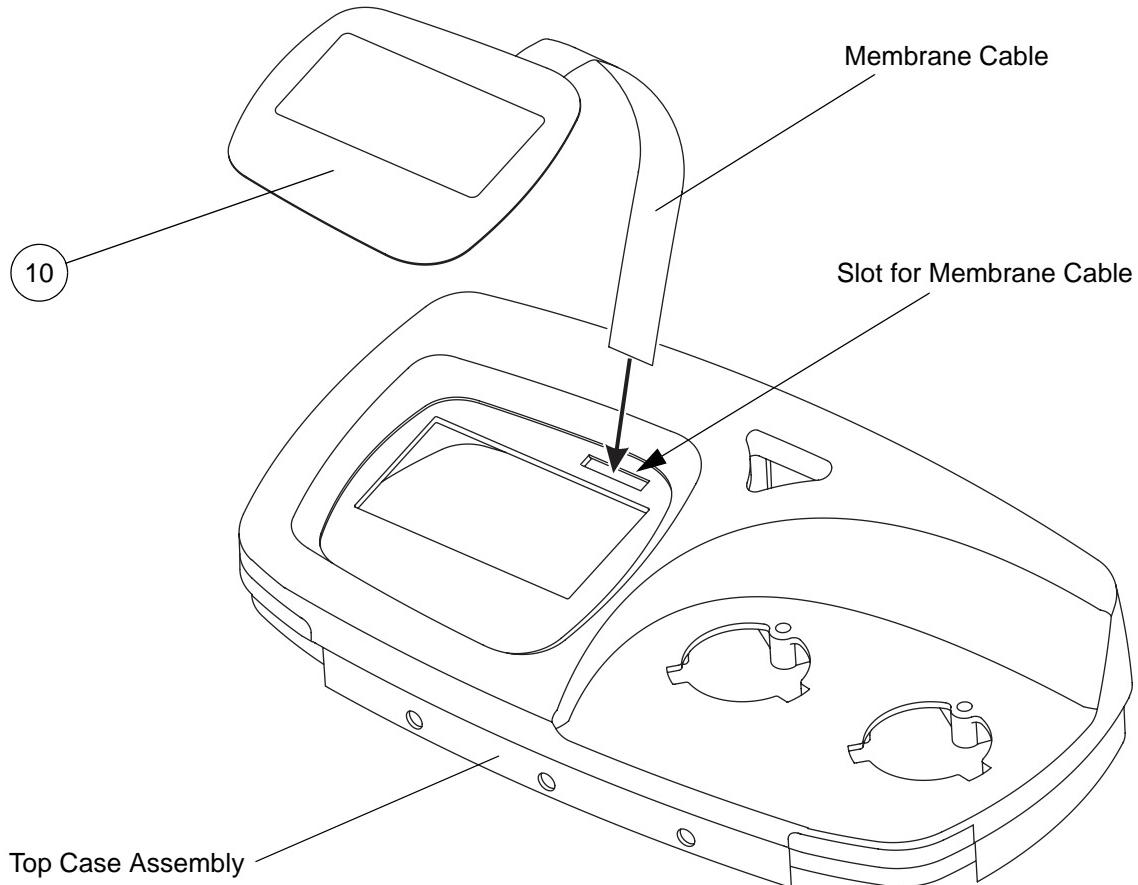
**CAUTION: Do NOT over-tighten the screws or you may damage the LCD sub-assembly.**

- 29.6 Turn the control PCB assembly over and remove the protective plastic film from the front of the LCD sub-assembly.
- 29.7 Before completing the installation, check the membrane label on the top case assembly. If it is damaged, replace it (refer to Chapter 5, Page 37, Section 30).

### Installing the Control PCB Assembly into the Top Case Assembly

- 29.8 Install the complete control PCB assembly (including the LCD sub-assembly) into the top case assembly, as follows (refer to Chapter 5, Page 29, Section 25):
  - 29.8.1 Make sure the **Run** button is fitted in the cutout in the top case and the button return spring is fitted onto the **Run** button.
  - 29.8.2 Lower the control PCB assembly onto the four pillars in the top case assembly.
  - 29.8.3 Install the four screws to secure the control PCB assembly.
  - 29.8.4 Carefully push the end of the membrane cable into the membrane connector on the control PCB assembly.
 

**Note:** *Less than 2mm of the membrane cable can be inserted into the connector.*
  - 29.8.5 Install the motor and manifold assembly onto the control PCB assembly.
  - 29.8.6 Install the top case assembly onto the front case assembly.
  - 29.8.7 Install the hoseset assemblies onto the pump.



**Figure 54 - Replacing the Membrane Label when the Control PCB Assembly has been removed from the Top Case Assembly**

**Table 22 - Top Case Membrane Label Parts List**

Item	Part Number	Description	Qty
10	507397	Top Case Membrane Label	1

### 30 Replacing the Membrane Label by removing the Control PCB Ass'y from the Top Case Ass'y

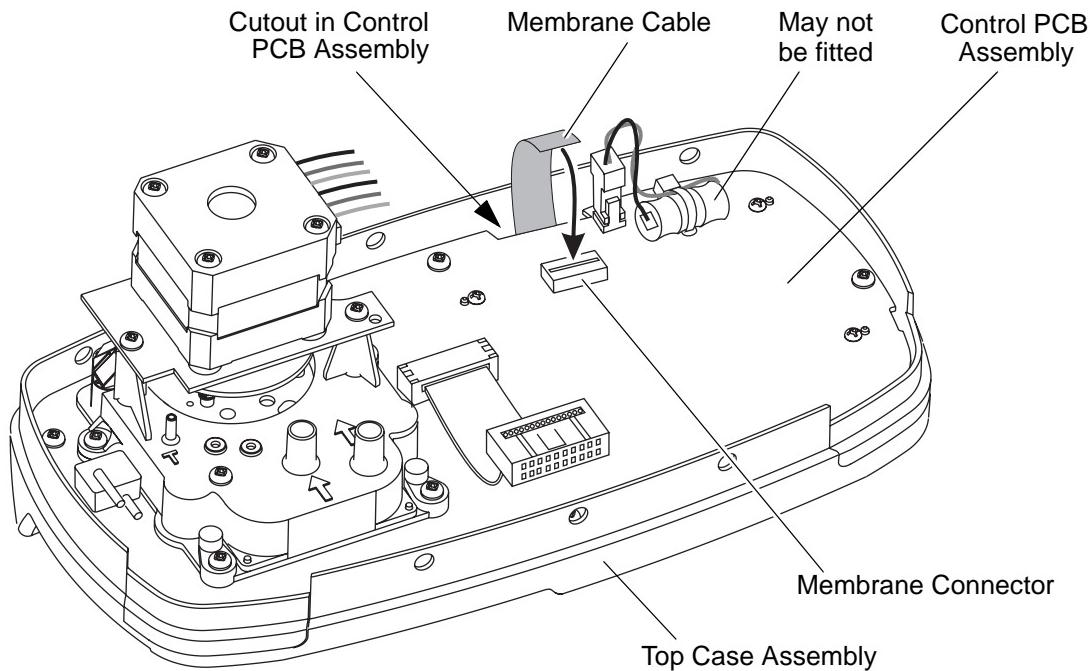
If the pump is being dis-assembled to replace the LCD sub-assembly, then carry out the following procedure to replace the membrane label.

- 30.1 Remove the complete control PCB assembly from the top case assembly (refer to Chapter 5, Page 29, Section 24).
- 30.2 Remove the **Run** button and button return spring from the top case assembly.
- 30.3 Turn the top case assembly over, so that the membrane label is on top.
- 30.4 Remove the self-adhesive membrane label (Fig 54, Item 10) from the top case assembly, and withdraw the membrane cable out through the slot in the top case assembly.

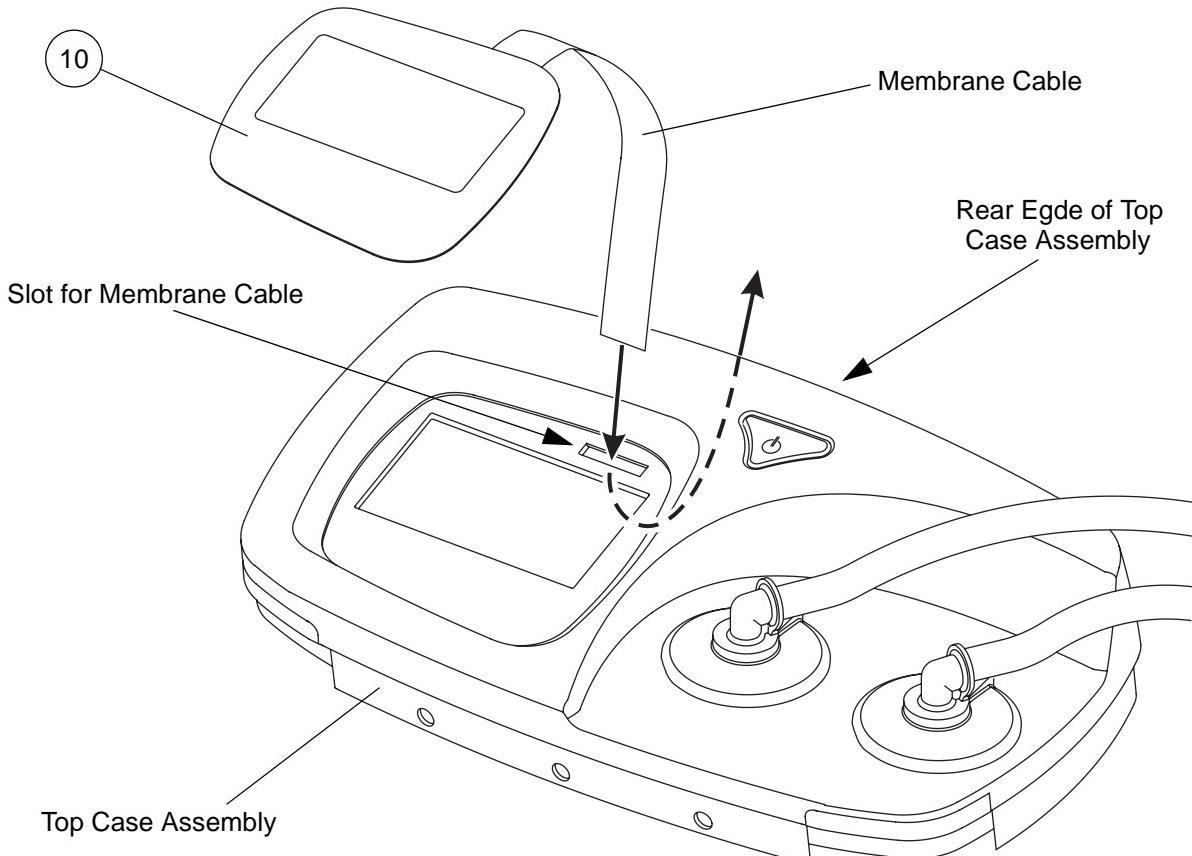
**Note:** *If you use a sharp tool to remove the membrane label, be careful not to scratch or damage the surface of the top case.*

**Note:** *The old membrane label must be discarded because of the loss of adhesive and possible damage to it during the removal process.*

- 30.5 Inspect the surface of the top case from where the membrane label was removed. Carefully remove any adhesive residue.
- 30.6 Remove the backing paper from the new self-adhesive membrane label (Fig 54, Item 10).
- 30.7 Make sure the orientation of the membrane label is correct and pass the end of the membrane cable through the slot in the top case assembly (refer to Figure 54).  
**Note:** *Do not bend or crease the membrane cable.*
- 30.8 Align the membrane label with the recess in the top case, and lower the membrane label onto the top case. Press down firmly on the membrane label to secure it to the top case.  
**Note:** *Make sure the alignment is correct before you stick the membrane label to the top case. If you have to remove the membrane label to re-align it, then the membrane label will have to be discarded because of the loss of adhesive and possible damage to it.*
- 30.9 Turn the top case assembly over, so that the membrane label is on the underside.
- 30.10 Put the **Run** button into the cutout in the top case, and put the button return spring over the shaft of the **Run** button.
- 30.11 Install the complete control PCB assembly into the top case assembly (refer to Chapter 5, Page 29, Section 25).



**Figure 55 - Connecting the Membrane Cable to the Membrane Connector on the Control PCB Assembly**



**Figure 56 - Replacing the Membrane Label without removing the Control PCB Assembly from the Top Case Assembly**

## 31 Replacing the Membrane Label without removing the Control PCB Assembly

If the LCD sub-assembly is **NOT** being replaced, then carry out the following procedure to replace the membrane label. The hoseset assemblies can remain connected to the pump.

- 31.1 Separate the top case assembly from the front case assembly (refer to SER0009, Chapter 5, "Pump Repair", Page 13, Section 14):

**Note:** *Do NOT remove the hoseset assemblies or control PCB assembly from the top case assembly.*

**Note:** *Turn the top case assembly over so that the control PCB assembly is on top.*

**Note:** *Remove the membrane cable from the membrane connector on the control PCB assembly (refer to Figure 55).*

**Note:** *Turn the top case assembly over so that the membrane label is on top.*

**Note:** *Remove the self-adhesive membrane label (Fig 56, Item 10) from the top case assembly, and withdraw the membrane cable out through the slot in the top case assembly.*

**Note:** *If you use a sharp tool to remove the membrane label, be careful not to scratch or damage the surface of the top case.*

**Note:** *The old membrane label must be discarded because of the loss of adhesive and possible damage to it during the removal process.*

- 31.2 Inspect the surface of the top case from where the membrane label was removed. Carefully remove any adhesive residue.

- 31.3 Remove the backing paper from the new self-adhesive membrane label (Fig 56, Item 10).

- 31.4 Make sure the orientation of the membrane label is correct, and then do the following:

- 31.4.1 Pass the end of the membrane cable through the slot in the top case assembly and then towards the rear edge of the top case assembly (refer to Figure 56).

- 31.4.2 Carefully guide the end of the membrane cable so that it passes through the cutout in the control PCB assembly (refer to Figure 55).

**Note:** *Do not bend or crease the membrane cable.*

- 31.5 Align the membrane label with the recess in the top case, and lower the membrane label onto the top case. Press down firmly on the membrane label to secure it to the top case.

**Note:** *Make sure the alignment is correct before you stick the membrane label to the top case. If you have to remove the membrane label to re-align it, then the membrane label will have to be discarded because of the loss of adhesive and possible damage to it.*

- 31.6 Turn the top case assembly over so that the control PCB assembly is on top.

- 31.7 Carefully push the end of the membrane cable into the membrane connector on the control PCB assembly.

**Note:** *Less than 2mm of the membrane cable can be inserted into the connector.*

- 31.8 Install the top case assembly onto the front case assembly (refer to SER0009, Chapter 5, "Pump Repair", Page 14, Section 15).

**Table 23 - Top Case Membrane Label Parts List**

Item	Part Number	Description	Qty
10	507397	Top Case Membrane Label	1

## 32 Removing the Run Button

- 32.1 Remove the control PCB assembly from the pump (Refer to Page 27, Section 22).
- 32.2 Remove the button return spring (Fig 48, Item 60) and the **Run** button (Fig 48, Item 50) from the top case assembly (Fig 48, Item 20).

## 33 Installing the Run Button

- 33.1 Install the **Run** button (Fig 48, Item 50) into the cutout in the top case assembly (Fig 48, Item 20).
- 33.2 Install the button return spring (Fig 48, Item 60) onto the **Run** button.
- 33.3 Install the control PCB assembly into the top case assembly, and then re-assemble the pump (Refer to Page 29, Section 25).

## 34 Replacing the Top Case Assembly

The top case assembly (Fig 48, Item 20) comprises the top case moulding and the membrane label.

- 34.1 Remove the control PCB assembly from the top case assembly (Refer to Page 27, Section 22).
- 34.2 Remove the **Run** button (Refer to Page 40, Section 32).
- 34.3 Install the **Run** button into the new top case assembly (Refer to Page 40, Section 33).
- 34.4 Install the control PCB assembly into the top case assembly, and then re-assemble the pump (Refer to Page 29, Section 25).

### 35 Replacing the Battery on the Control PCB Assembly (if fitted)

**Note:** The battery on the control PCB assembly provides power for the real time clock. If the battery is disconnected for more than 20 seconds, the real time clock will lose its time and date settings. If the time and date settings are lost, they have to be reloaded from a PC-based service tool, so this procedure should only be carried out in a ArjoHuntleigh service environment.

**Note:** In the following procedure, do not disconnect the 2-pin battery cable connector from the control PCB assembly until instructed to do so.

- 35.1 Remove the control PCB assembly from the pump (Refer to Page 27, Section 22).
- 35.2 Cut and remove the cable tie (Fig 57, Item 20) which secures the battery (Fig 57, Item 10) to the control PCB assembly (Fig 57, Item 30), and move the battery a small distance away.
- 35.3 Put the new battery (Fig 57, Item 10) onto the control PCB assembly, adjacent to the old battery.
- 35.4 Secure the new battery to the control PCB assembly with a new cable tie (Fig 57, Item 20).
- 35.5 Disconnect the old battery and connect the new battery **in less than 20 seconds**, as follows.
  - 35.5.1 Disconnect the 2-pin battery cable connector from the battery connector on the control PCB assembly (Fig 57, PCB Con 5), and remove the battery.
  - 35.5.2 Connect the 2-pin battery cable connector onto the control PCB assembly.
- 35.6 Install the control PCB assembly into the top case assembly, and then re-assemble the pump (Refer to Page 29, Section 25).

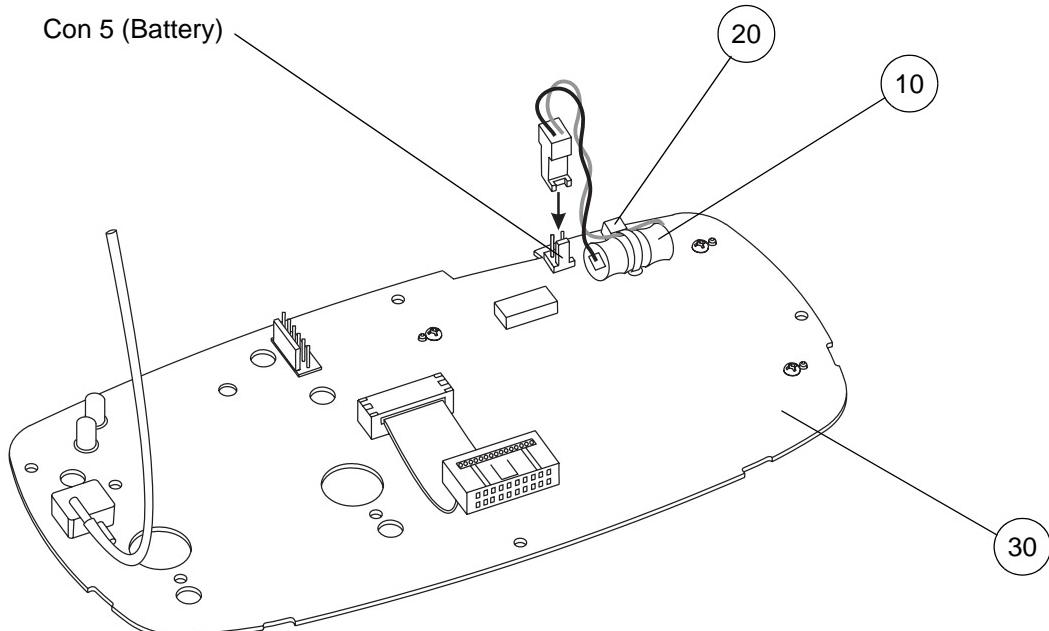
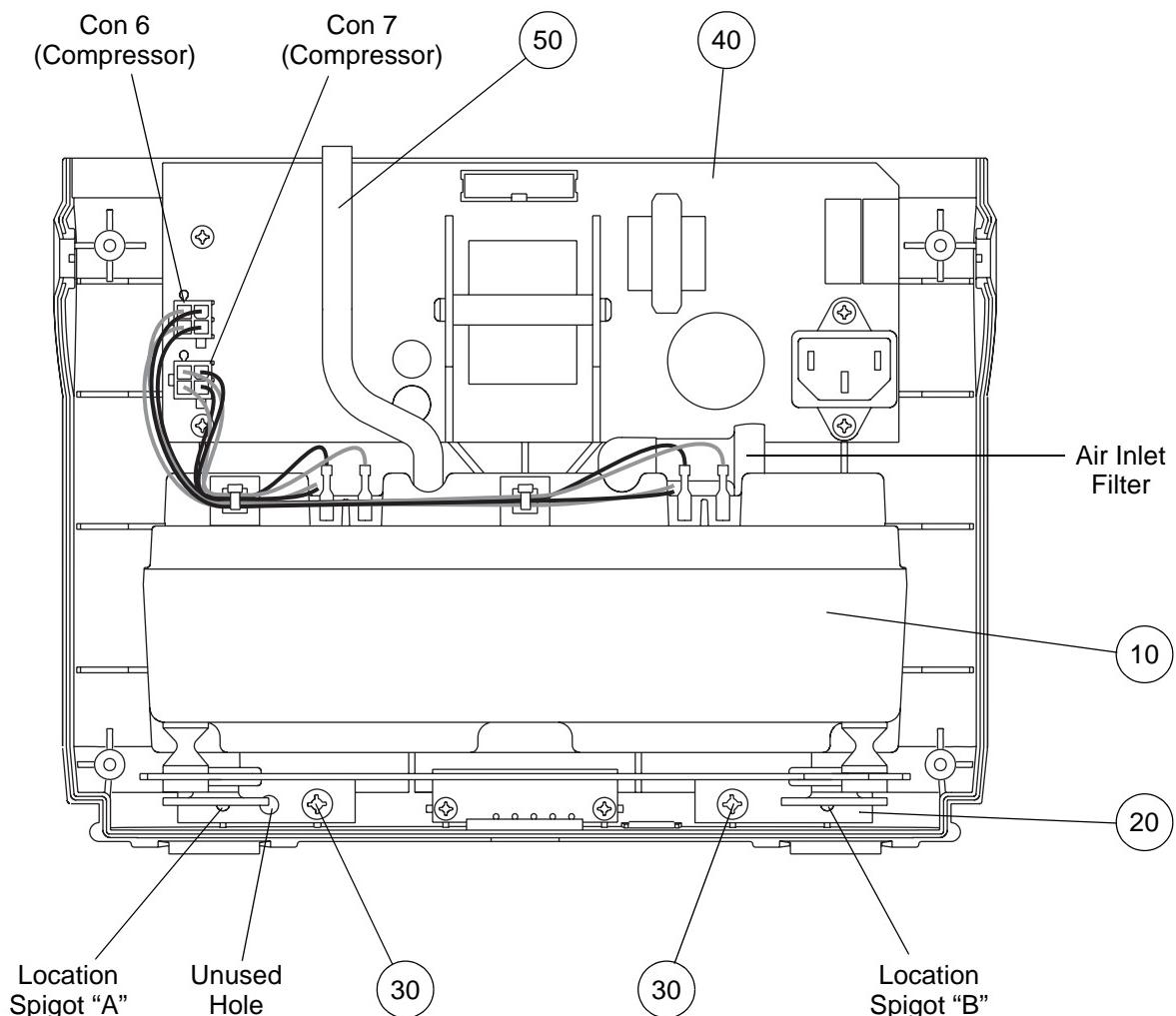


Figure 57 - Replacing the Rechargeable Battery

Table 24 - Rechargeable Battery Parts List

Item	Part Number	Description	Qty
10	151457	Rechargeable Battery, Spares Item	1
20	BP196	Cable Tie	1
30	REF	Control PCB Assembly, Spares Item	1



**Figure 58 - Replacing the Compressor Assembly and Compressor Filter**

**Table 25 - Compressor Assembly and Compressor Filter Parts List**

Item	Part Number	Description	Qty
10	509051	Compressor Assembly, Series 6, 5.5V 50/60Hz	1
20	507316	Compressor Mounting Bracket	1
30	FAS218	Screw, 4mm dia x 12 Pan Head	2
40	REF	Power Supply PCB Assembly, Spares Item	1
50	631073	Tube, 100mm long (Compressor - Motor & Manifold Assy)	1

## 36 Removing the Compressor Assembly and Mounting Bracket

- 36.1 Remove the rear case from the pump (Refer to Page 13, Section 10).
- 36.2 Lay the front case down with the inside surface pointing upwards.
- 36.3 Disconnect the large diameter tube (Fig 58, Item 50) from the compressor assembly.
- 36.4 Disconnect the two compressor cable connectors (Fig 58, PCB Con 6 and 7) from the power supply PCB assembly (Fig 58, Item 40).
- 36.5 Remove the two screws (Fig 58, Item 30), and lift the compressor assembly and mounting bracket (Fig 58, Items 10 and 20) out of the front case.

## 37 Installing the Compressor Assembly and Mounting Bracket

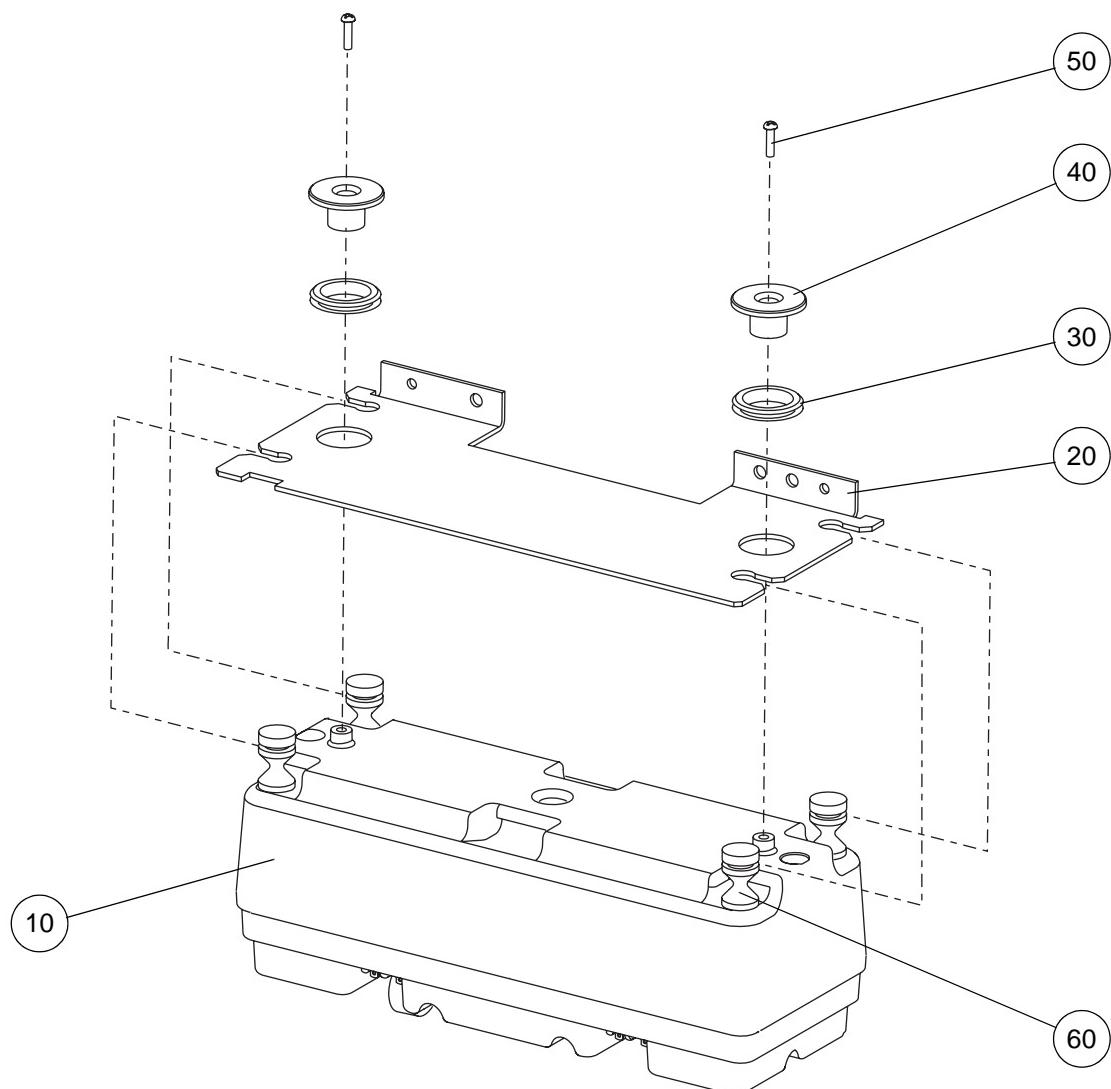
- 37.1 Before installing the compressor assembly and mounting bracket (Fig 58, Items 10 and 20), check the following parts are installed correctly on it (Refer to Figure 61):
  - 37.1.1 The air inlet filter into the air inlet filter holder.
  - 37.1.2 The eight push-on cable connectors, from the power supply PCB assembly (Fig 58, PCB Con 6 and 7).
- 37.2 Put the compressor assembly and mounting bracket into the front case.

**Note:** *Make sure the two locating holes at the outer ends of the mounting bracket are installed over the corresponding location spigots "A" and "B" in the front case (Refer to Figure 58).*

**Note:** *Make sure the wires from the power supply PCB assembly to the battery pack connector do not lie on top of the circular compressor support rubbers (Refer to Figure 50).*
- 37.3 Install the two screws (Fig 58, Item 30) through the mounting bracket (Fig 58, Item 20) and into the front case.

**Note:** *One hole in the left side of the mounting bracket is not used (Refer to Figure 58).*
- 37.4 Connect the large diameter tube (Fig 58, Item 50) onto the compressor assembly.

**Note:** *Make sure the other end of the tube is still connected to the correct inlet tube on the motor and manifold assembly (Figure 41).*
- 37.5 Connect the two compressor cable connectors (Fig 58, PCB Con 6 and 7) onto the power supply PCB assembly (Fig 58, Item 40).
- 37.6 Install the rear case onto the pump (Refer to Page 13, Section 11).



**Figure 59 - Removing the Compressor Assembly from the Mounting Bracket**

**Table 26 - Compressor Assembly and Mounting Bracket Parts List**

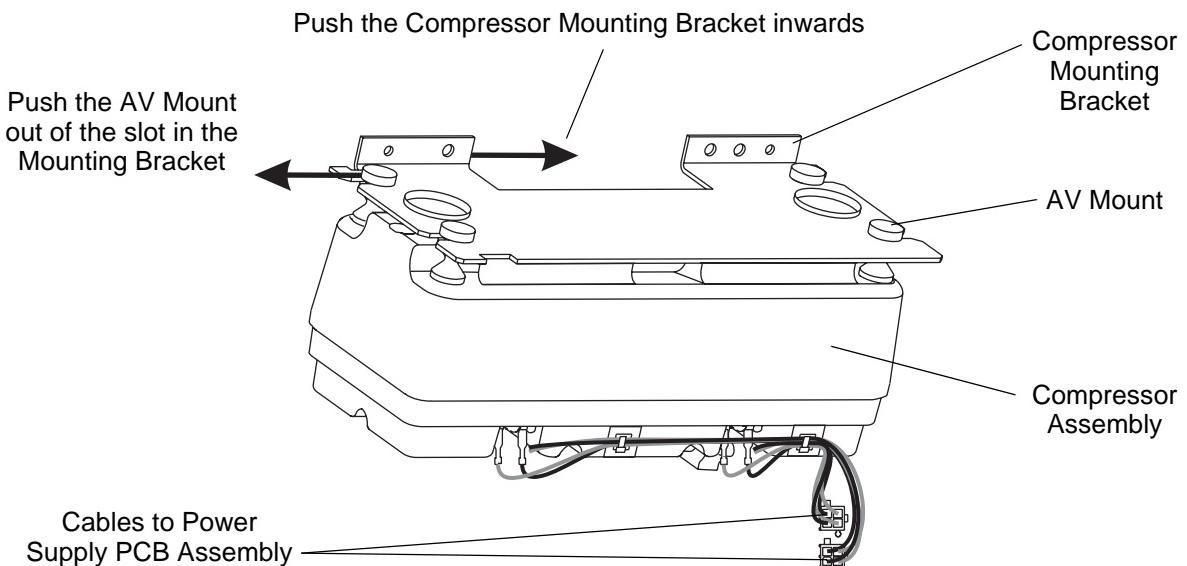
Item	Part Number	Description	Qty
10	509051	Compressor Assembly, Series 6, 5.5V 50/60Hz	1
20	507316	Compressor Mounting Bracket	1
30	507380	Compressor Bracket Grommet	2
40	507317	Compressor Bump Stop	2
50	FAS223	Screw, 3 dia x 10 Pan Head	2
60	509307	Anti-vibration (AV) Mount, Series 6	4

## 38 Removing the Compressor Assembly from the Mounting Bracket

- 38.1 Remove the compressor assembly and mounting bracket from the pump (Refer to Page 43, Section 36).
- 38.2 Lay the compressor assembly (Fig 59, Item 10) and mounting bracket (Fig 59, Item 20) down with the mounting bracket on top (Refer to Figure 60).
- 38.3 Remove the two screws (Fig 59, Item 50) and compressor bump stops (Fig 59, Item 40) from the compressor assembly (Fig 59, Item 10) and mounting bracket (Fig 59, Item 20).
- 38.4 The compressor assembly is still attached to the mounting bracket via the four anti-vibration (AV) mounts (Fig 59, Item 60). Separate the compressor assembly from the mounting bracket, as follows (Refer to Figure 60):
  - 38.4.1 Start at one corner of the compressor assembly.
  - 38.4.2 Hold the compressor assembly, and push the mounting bracket in towards the centre of the compressor assembly.
  - 38.4.3 At the same time, carefully push the AV mount in the opposite direction and out of the slot in the mounting bracket.
  - 38.4.4 Repeat for the other three corners of the compressor assembly.

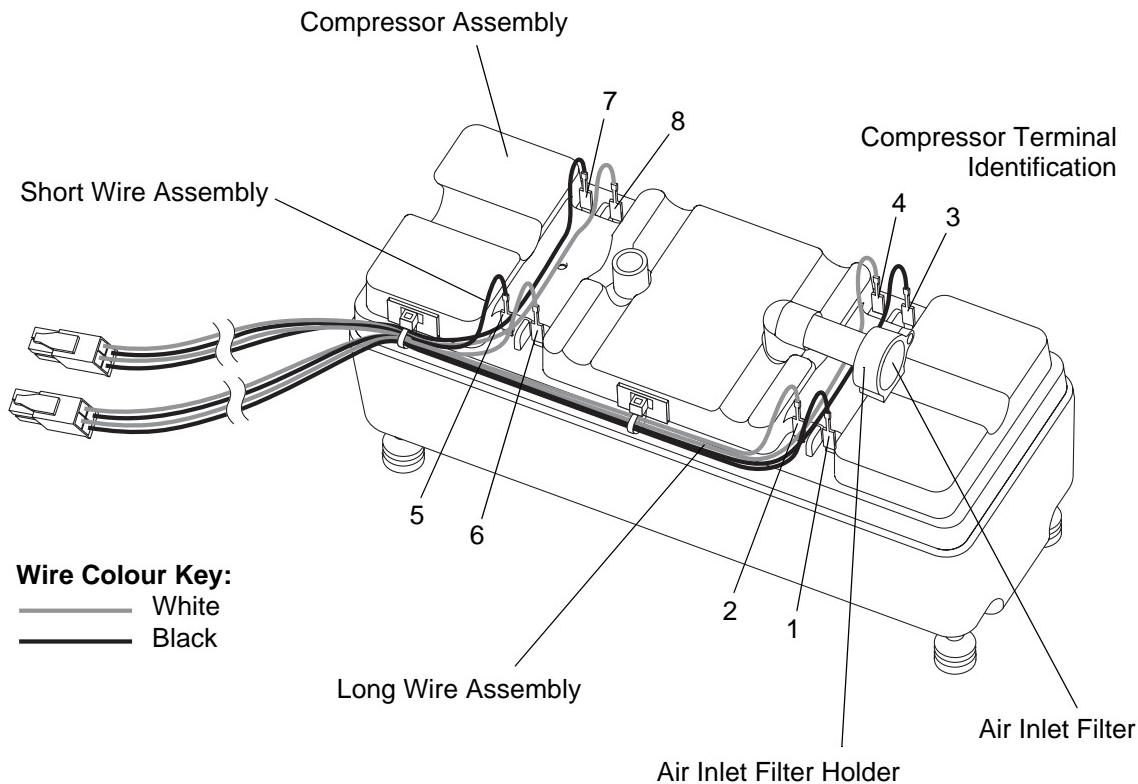
## 39 Installing the Compressor Assembly onto the Mounting Bracket

- 39.1 Lay the compressor assembly (Fig 59, Item 10) down with the AV mounts (Fig 59, Item 60) on top, and the two cables to the power supply PCB assembly at the front (Refer to Figure 60).
- 39.2 Lay the mounting bracket (Fig 59, Item 20) on top of the compressor assembly, with the angled part of the mounting bracket on top and at the back of the compressor assembly (Refer to Figure 60).
- 39.3 At one end of the compressor assembly, carefully push the grooved part of the two AV mounts into the slots in the mounting bracket (Refer to Figure 60).



**Figure 60 - Removing the AV Mounts from the Mounting Bracket**

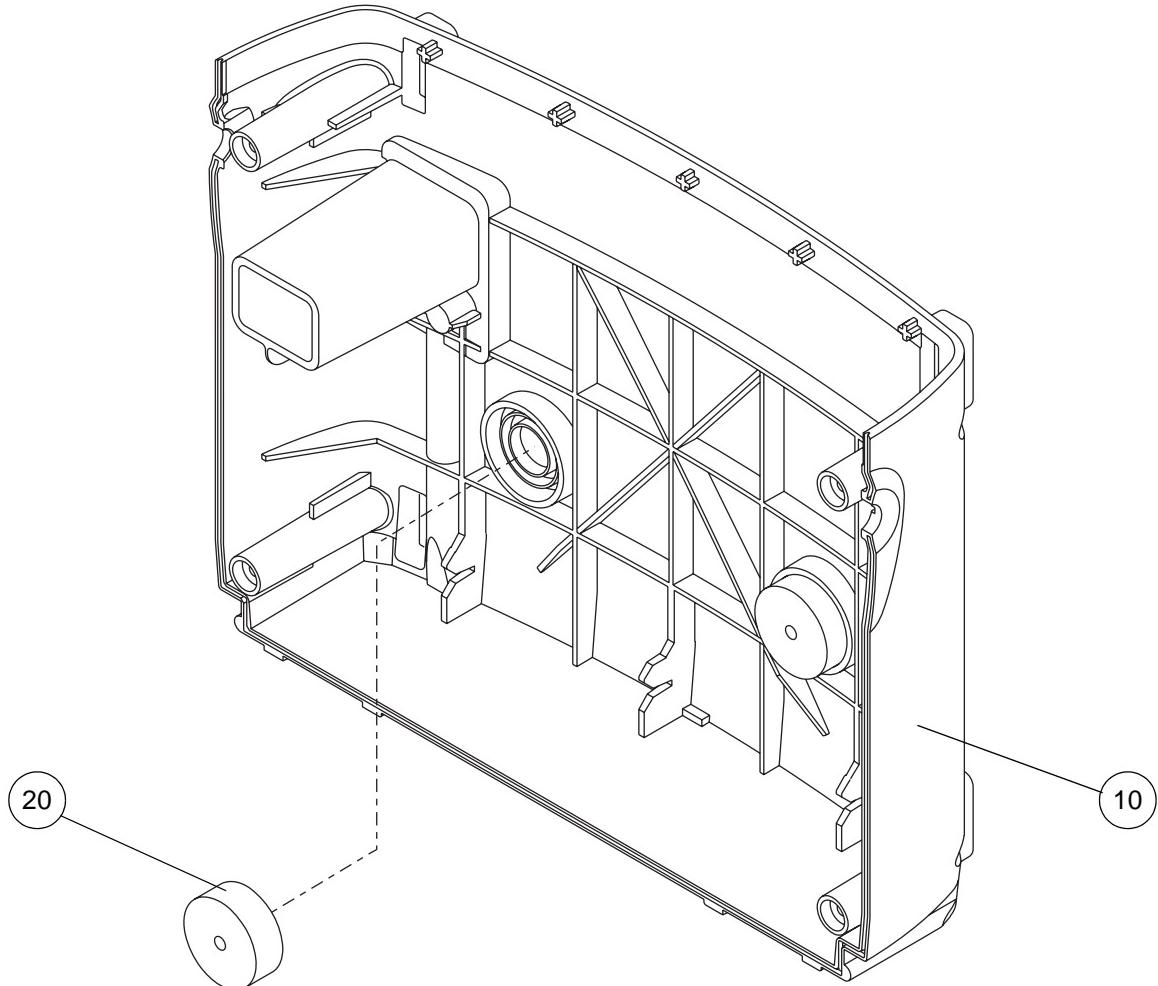
- 39.4 At the other end of the compressor assembly, do the following (Refer to Figure 60):
- 39.4.1 Hold the compressor assembly, and push the mounting bracket in towards the centre of the compressor assembly.
  - 39.4.2 At the same time, carefully push the grooved part of the remaining two AV mounts into the slots in the mounting bracket.
- 39.5 Install the two compressor bump stops (Fig 59, Item 40) through the compressor bracket grommets (Fig 59, Item 30), and over the spigots in the compressor assembly.
- 39.6 Install the two screws (Fig 59, Item 50) to secure the compressor bump stops.
- 39.7 Check that the two wire assemblies (long and short) are correctly connected to the compressor assembly. Refer to Figure 61 for the correct wire colours and compressor terminal connections.
- Note:** *The two wire assemblies are part of the compressor assembly.*
- 39.8 Install the compressor assembly and mounting bracket into the pump (Refer to Page 43, Section 37).



**Figure 61 - Compressor Assembly**

## 40 Replacing the Rear Case

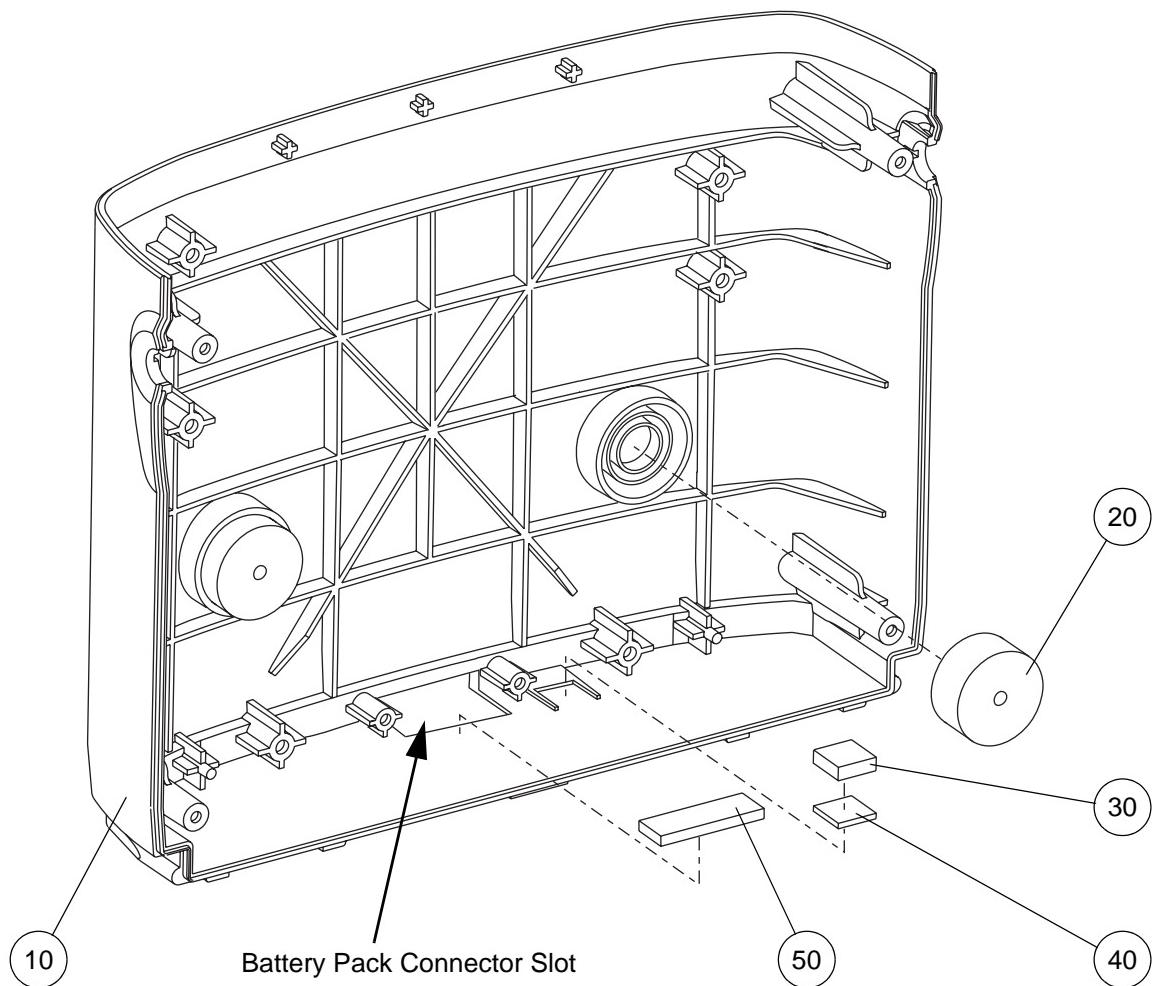
- 40.1 Remove the mains/power cordset from the pump (Refer to Page 7, Section 6).
- 40.2 Remove the handle and hook assembly, and the rear case, from the pump (Refer to Page 13, Section 12).
- 40.3 Lay the new rear case (Fig 62, Item 10) down with the inside surface pointing upwards.
- 40.4 Stick the two compressor support rubbers (Fig 62, Item 20) onto the front case.
- 40.5 Install the handle and hook assembly, and the rear case, onto the pump (Refer to Page 13, Section 13).
- 40.6 Install the mains/power cordset onto the pump (Refer to Page 7, Section 7).
- 40.7 Stick the serial number and product labels onto the rear case (Refer to Page 3, Section 2).



**Figure 62 - Replacing the Rear Case**

**Table 27 - Rear Case Parts List**

Item	Part Number	Description	Qty
10	507302	Rear Case	1
20	BP027	Compressor Support Rubber	2

**Figure 63 - Replacing the Front Case****Table 28 - Front Case Parts List**

Item	Part Number	Description	Qty
10	507396	Front Case, Printed Flowtron Universal	1
20	BP027	Compressor Support Rubber	2
30	BP042	Ferrite Magnet	1
40	507386	Magnet Mounting Pad	1
50	507410	Connector Sealing Strip	1

## 41 Replacing the Front Case

- 41.1 Separate the top case assembly from the front case (Refer to Page 15, Section 14).
- 41.2 Remove the power supply PCB assembly, compressor assembly and mounting bracket from the pump (Refer to Page 31, Section 26).
- 41.3 Lay the new front case (Fig 63, Item 10) down with the inside surface pointing upwards.
- 41.4 Stick the following parts to the front case:
  - 41.4.1 The two compressor support rubbers (Fig 63, Item 20).
  - 41.4.2 The connector sealing strip (Fig 63, Item 50), adjacent to the battery pack connector slot.
  - 41.4.3 The magnet mounting pad (Fig 63, Item 40) onto the front case, in the appropriate slot.
  - 41.4.4 The ferrite magnet (Fig 63, Item 30) onto the ferrite mounting pad.

**Note:** *Make sure the ferrite magnet and magnet mounting pad are aligned with the sides of the slot in the front case.*
- 41.5 Install the power supply PCB assembly, compressor assembly and mounting bracket onto the pump (Refer to Page 31, Section 27).
- 41.6 Install the top case assembly onto the front case (Refer to Page 16, Section 15).



## CHAPTER 6

### UPDATING THE SOFTWARE

#### 1 Introduction

This section describes the procedure to upgrade the pump software to Version 3.01. The upgrade is required to improve the reliability of the kinked-tube alarm for supine patients.

The upgrade should be carried out on any pump within the serial number range specified but only at the following times:

- At the next scheduled service.
- After any repair carried out on the pump.
- If the pump is exhibiting excessive kinked-tube alarms.

Serial Number range:

Any pump up to and including serial number:	507032000 <sup>(a)</sup>
---	--------------------------

- a. All pumps from serial number 507032001 onwards already have version 3.01 (or later) software installed at the factory.

Before upgrading the pump to the new V3.01 software, check the current software version by initialising the pump (refer to Chapter 6, Page 15, Section 8). If the software is already at V3.01 or higher, do not attempt the upgrade.

To perform the check and the upgrade, a Personal Computer is required, equipped with a serial port and running Microsoft® Windows®. This Laptop or PC must have the ArjoHuntleigh Serial Communications Pack software installed in order to communicate with the pump. To install the Serial Communications Pack, refer to Chapter 6, Page 9, Section 3.

## 2 Installing the Communicator Software

The Communicator software (Table 29, Item 10) can only be installed on a Laptop PC or a Desktop PC which is fitted with a serial port and is running Microsoft® Windows®.

The Communicator software is installed and run on the PC, which sets up a Windows Graphical User Interface (GUI) on the computer. The different menus provide full user control of the pump.

On some PCs, new software can only be installed by someone with **Administrator** privileges:  
e.g. your IT department.

**Table 29 - Communicator Software Parts List**

Item	Test Equipment	Part Number
10	ArjoHuntleigh Communicator Software, Issue <b>03</b> or higher	SERS001-03

- 2.1 Make sure that any other programs running on the PC have been closed.
- 2.2 Load the Communicator software CD ROM (Table 30, Item 10) into the PC. The Communicator software should start to auto-install.
- 2.3 After a few seconds, the **Initialisation** dialog box should be displayed (refer to Figure 64).



**Figure 64 - Communicator Software Installation - Initialisation**

- 2.4 If there is a **Log On as Administrator** (or similar) error message displayed immediately the auto-installation process starts, then contact your IT department to install the software.

**Note:** Normally, only IT personnel will have the correct privileges to log on as **Administrator**.

- 2.5 After the **Initialisation** dialog box has been displayed, the **Close Other Applications** dialog box will be displayed (refer to Figure 65).



**Figure 65 - Communicator Software Installation - Close Other Applications**

- 2.6 Make sure that any other applications running on the PC have been closed, and then click **OK**.  
 2.7 The **Start Installation** dialog box will be displayed (refer to Figure 66).



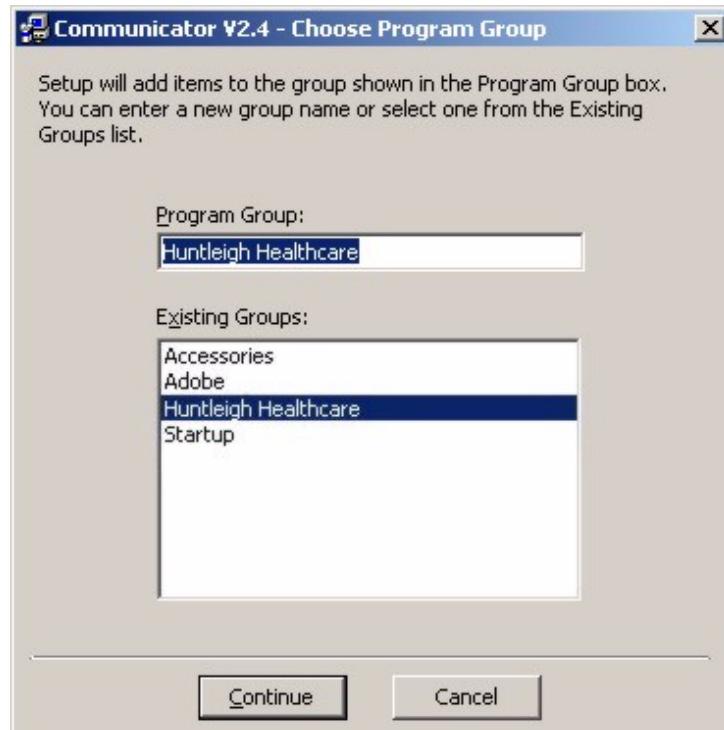
**Figure 66 - Communicator Software Installation - Start Installation**

- 2.8 Click the  button to start the installation process, using the suggested default directory.  
 2.9 The **Create Short Cuts** dialog box will be displayed (refer to Figure 67).



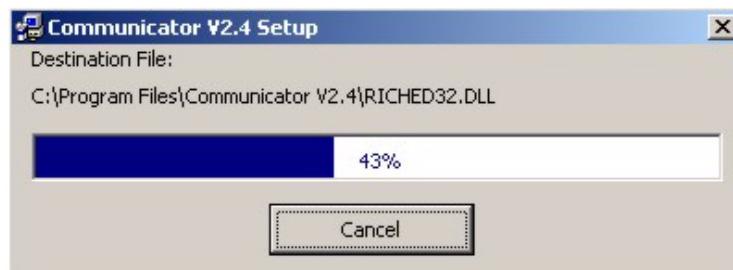
**Figure 67 - Communicator Software Installation - Create Short Cuts**

- 2.10 The default option is already ticked, which will put a shortcut on the PC desktop. Click **OK** and the **Choose Program Group** dialog box will be displayed (refer to Figure 68).



**Figure 68 - Communicator Software Installation - Choose Program Group**

- 2.11 Click **Continue** to use the suggested default program group.  
2.12 The installation process will start, and the progress will be indicated by a moving bar (refer to Figure 69).



**Figure 69 - Communicator Software Installation - Progress**

- 2.13 At the end of the installation, the **Installation Complete** dialog box will then be displayed to indicate that the Communicator software has been successfully installed (refer to Figure 70).



**Figure 70 - Communicator Software Installation - Complete**

Click OK and the Setup Message is then displayed (refer to Figure 71).



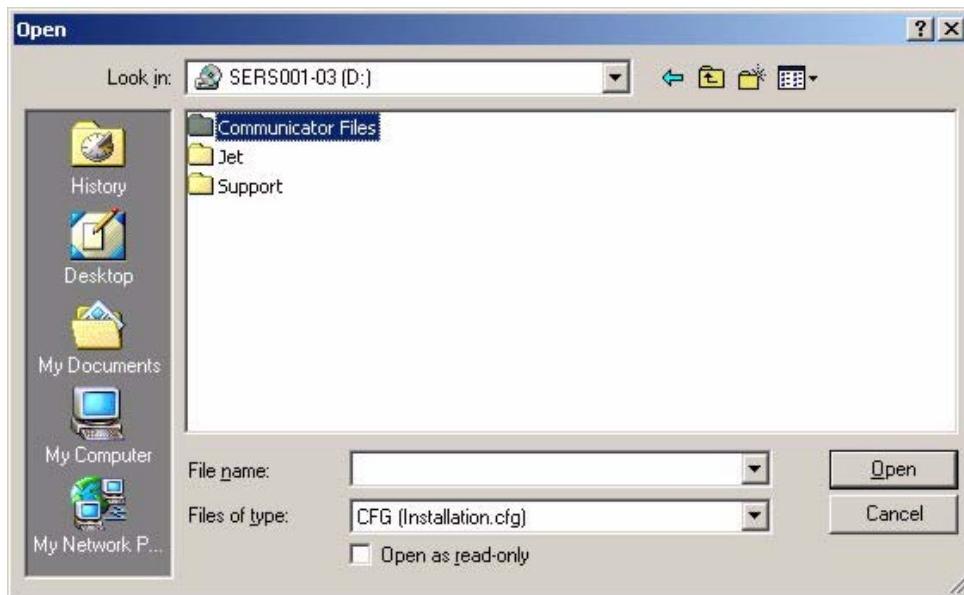
**Figure 71 - Communicator Software Installation - Setup Message**

- 2.14 In order to complete the installation, you need to copy files from the Communicator software CD ROM and then start the Communicator program running.  
**Note:** *It is preferable to do this now, while the CD ROM is still loaded in the PC.*
- 2.15 Click **Yes** to start copying the additional files, and then the Communicator program will be started automatically. The **File Location** dialog box is then displayed (refer to Figure 72).



**Figure 72 - Communicator Software Installation - File Location**

- 2.16 Click **OK**, and the **Open File** dialog box is displayed (refer to Figure 73).



**Figure 73 - Communicator Software Installation - Locating Communicator Files on the CD ROM**

- 2.17 Click on the down arrow on the right side of the **Look in** box at the top of the dialog box, and "browse" for **SERS001-03** (the Communicator software CD ROM), and select it.  
2.18 Click on **Communicator Files**, and click **Open** (refer to Figure 74).



**Figure 74 - Communicator Software Installation - Locating the "Installation.cfg" File**

- 2.19 Click on the **Installation.cfg** file, and click **Open**. The relevant files will be copied to complete the Communicator software installation process.

**Note:** While the files are copied, a **Communicator Command & Configuration Files** dialog box is displayed (refer to Figure 75).



**Figure 75 - Communicator Software Installation - Command and Configuration Files**

- 2.20 When the files have been copied, the Communicator software will then start to run (refer to Chapter 3 "Using the Communicator Software").
- 2.21 The installation is now complete, and you can now safely remove the Communicator software CD ROM from the PC.



Figure 76 - Communicator Software - Application Startup Screen

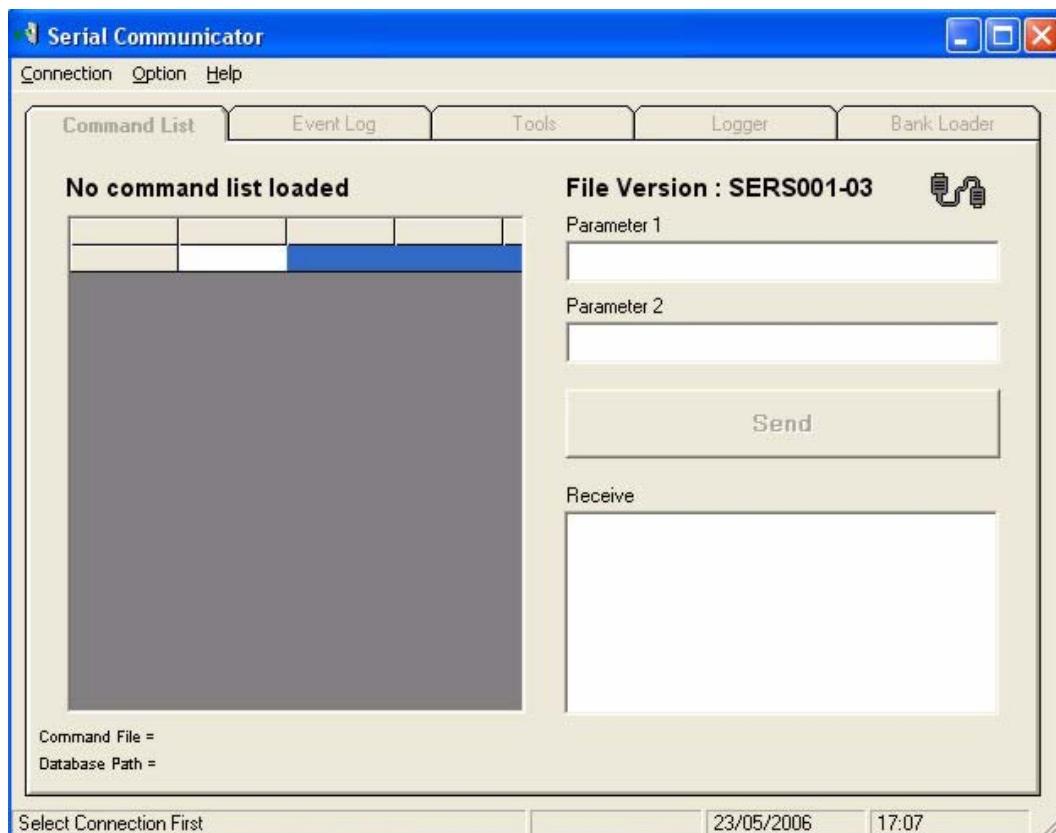
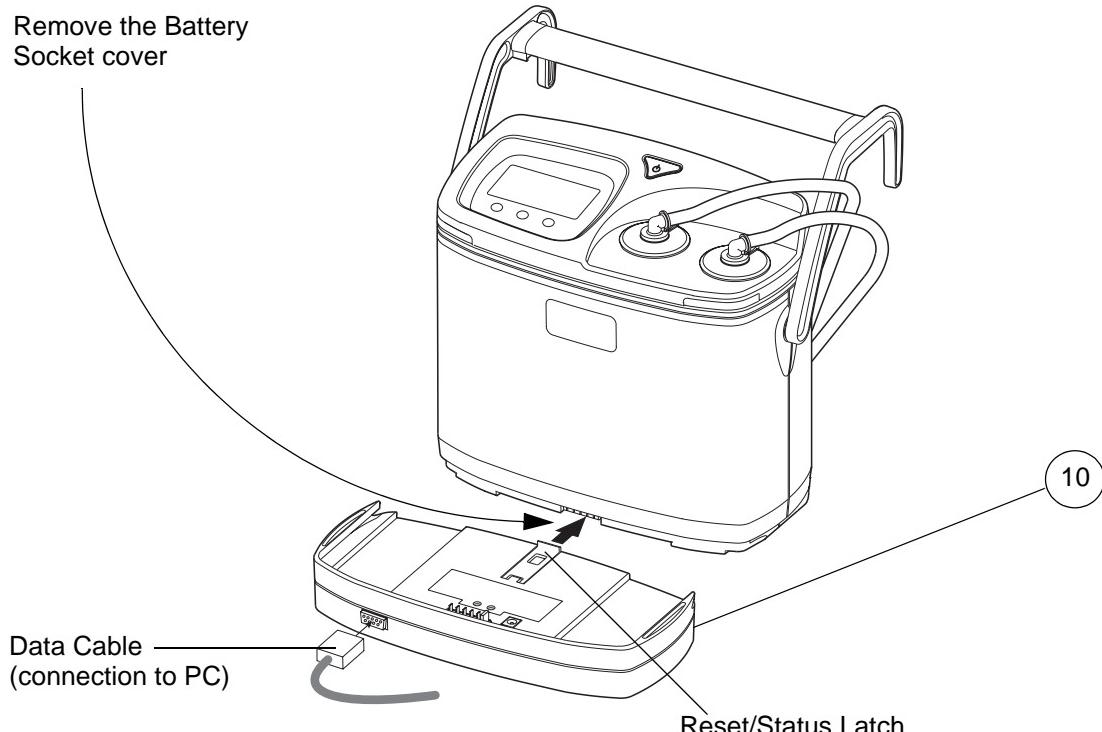


Figure 77 - Communicator Software - No Command List Loaded - Serial Communicator

### 3 Connecting the Pump to a Laptop / Desktop PC

- 3.1 The connection between the pump and the PC (laptop or desktop) is via the Serial Communications Pack (Fig 78, Item 10). The Serial Communications Pack is installed directly onto the bottom of the pump. The Serial Communications Pack connects to a serial communications port on the PC via an external cable and to the pump via an internal serial link.
- 3.2 To install the Serial Communications Pack onto the pump (refer to Figure 78):
  - 3.2.1 Remove the battery socket cover from the base of the pump.
  - 3.2.2 From the front of the pump, slide the Serial Communications Pack over the guides on the base of the pump, and click into place.
  - 3.2.3 Connect one end of the Data Cable to the 9-way connector on the Serial Communications Pack and the other end to the serial port on the PC.
- 3.3 To remove the Serial Communications Pack from the pump (refer to Figure 78):
  - 3.3.1 Remove the Data Cable from the Serial Communications Pack and the PC.
  - 3.3.2 Depress the Reset/Status Latch at the rear of the Serial Communications Pack.
  - 3.3.3 Slide the Serial Communications Pack out, towards the front of the pump.
  - 3.3.4 Install the battery socket cover onto the base of the pump.



**Figure 78 - Test Equipment**

**Table 30 - Test Equipment**

Item	Description	Part Number
10	Serial Communications Pack (with Data Cable)	507104
20	Laptop / Desktop PC with serial port, running Microsoft® Windows®	-
30	ArjoHuntleigh Communicator Software, Version <b>03</b> or higher	SERS001-03

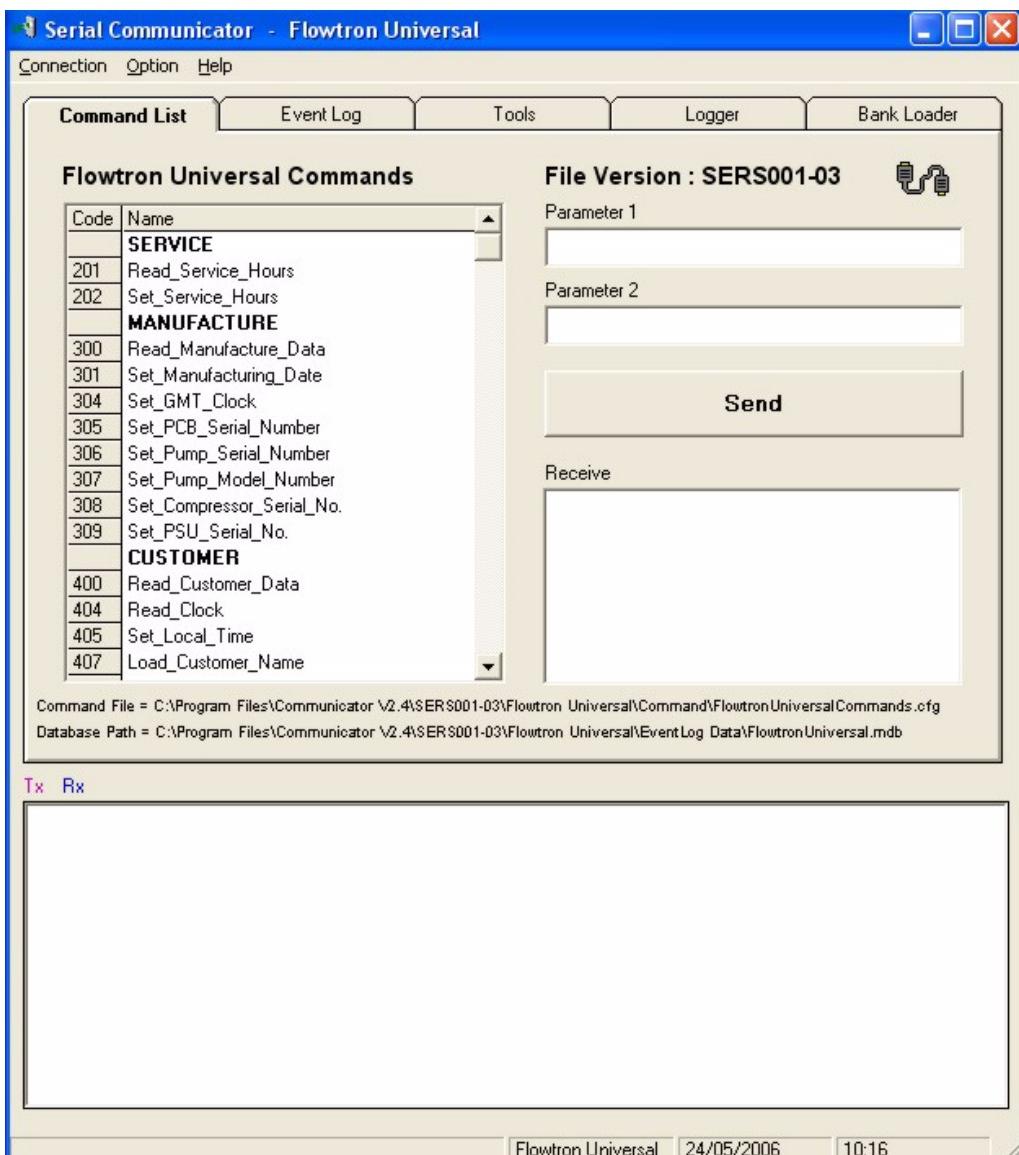


Figure 79 - Communicator Software - Flowtron Universal Commands with Screen Maximised



Figure 80 - Communicator Software - Communication Error

## 4 Launching the Communicator Software

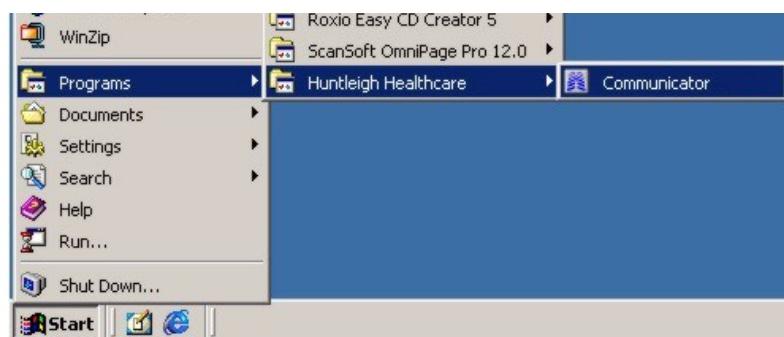
Make sure that the Communicator software is installed on the PC (Refer to Chapter 4 “Installing the Communicator Software”) and that the Serial Communications Pack (Fig 78, Item 10) is connected to the base of the pump and to the PC via the Data Cable (refer to Page 9, Section 3).

- 4.1 Double-click the **Communicator** icon on the desktop of the PC.



**Note:** If there is no Communicator icon visible, instead click on **Start, Programs, Huntleigh Healthcare and Communicator** as shown in Figure 81.

The view may vary slightly depending on your Windows® installation.

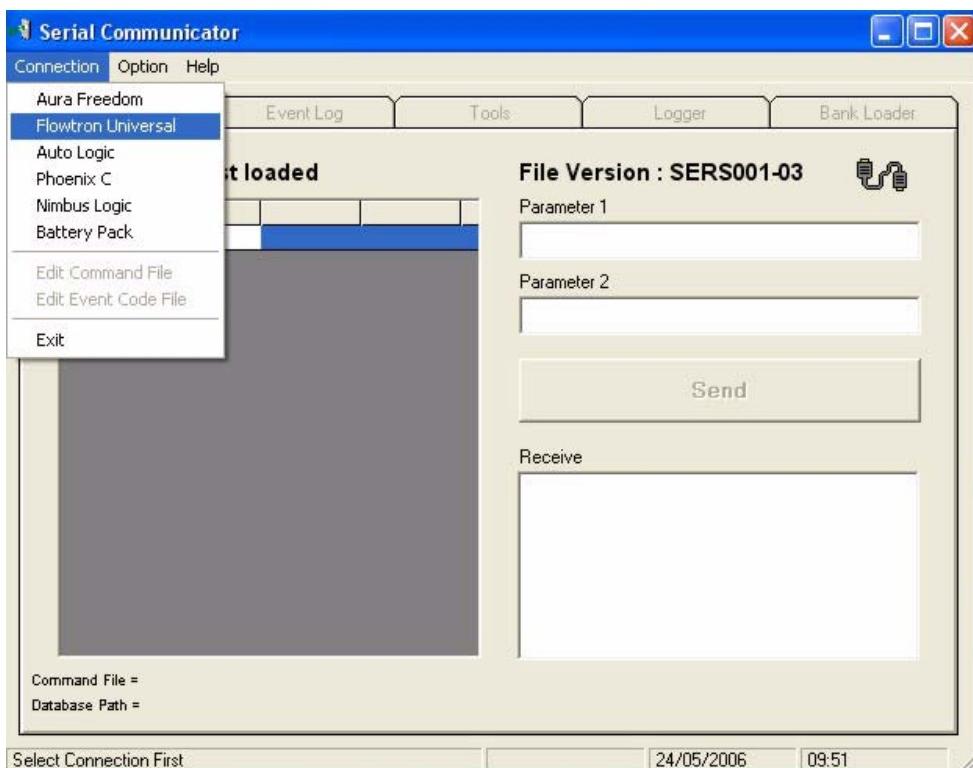


**Figure 81 - Launching Communicator from the Start Menu**

- 4.2 A “welcome” dialog box is briefly displayed, followed by the application startup dialog box (refer to Figure 76):
- 4.2.1 Using the **Please select COM port** drop-down menu, set the Serial Port to that which the Serial Communications Pack is connected to (normally either **COM1** or **COM2**).
  - 4.2.2 Click the **Serial Communicator** button on the **Please select software from list**. This will start the Communicator software running, using the Serial Communications Pack to connect the pump to the PC.
- Note:** Do NOT click the **IrDA Communicator**, **MCM Calibrator** or **Battery Pack Logger** buttons, as these functions are not used.
- 4.3 The **No command list loaded** dialog box will be displayed (refer to Figure 77).
- 4.3.1 Make sure the title at the top of the dialog box is **Serial Communicator** and the top right of the dialog box shows the **Serial Communicator** icon . If these are incorrect, then the Communicator software is not using the Serial Communications Pack to connect the pump to the PC.
  - 4.3.2 Make sure that the top right of the dialog box shows **File Version: SERS001-XX**, where **XX** is the version number, and must be **03** or higher. If this is incorrect, then the Communicator software has not been installed correctly.
- 4.4 Click **Connection**, then click **Flowtron Universal** (refer to Figure 82).
- 4.5 The menu of **Flowtron Universal Commands** is then displayed (refer to Figure 79).
- 4.6 Before starting any test procedure using the Communicator software, **always** click the middle button at the top right of the dialog box to maximise the screen (refer to Figure 79).
- Note:** The **Tx Rx** box will display all commands sent to the pump, all parameters sent with each command and all responses received from the pump.

## 5 Executing Commands on the Command Menu

- 5.1 Run the Communicator software on the PC (refer to Page 9, Section 3). Make sure that:
  - 5.1.1 The **Flowtron Universal Commands** menu is displayed.
  - 5.1.2 The screen is “maximised” to view the **Tx Rx** box (refer to Figure 79).
- 5.2 The **Flowtron Universal Commands** menu is comprised of two columns (refer to Figure 79):
  - 5.2.1 The **Code** column. This is the 3-digit command code sent to the pump.
  - 5.2.2 The **Name** column. This is a description of the command for the service engineer.
  - 5.2.3 If there is a 3-digit number in the **Code** column, then this is a command which will be sent to the pump e.g. **201 - Read\_Service\_Hours**.
  - 5.2.4 If the **Code** column is blank, then this is not a pump command, but a comment or instruction to the service engineer e.g. **SERVICE**.
- 5.3 To send a command to the pump:
  - 5.3.1 Click on the appropriate command on the left side of the dialog box e.g. **201 - Read\_Service\_Hours**.
  - 5.3.2 If instructed by the test procedure, add or change any parameters on the right side of the dialog box above the **Send** button.
  - 5.3.3 Click **Send** to send the command to the pump.
  - 5.3.4 The command and its parameters are displayed in the **Tx Rx** box.
  - 5.3.5 Any response from the pump is displayed in the **Receive** part of the dialog box and also in the **Tx Rx** box.
- 5.4 If the command is successful, **SUCCESS** is usually displayed in the **Receive** part of the dialog box e.g. **703 - SUCCESS**, where **703** is the command sent to the pump.
- 5.5 If a command is not recognised by the pump, the **Receive** part of the dialog box will show **NOT\_AVAILABLE** e.g. **501 = NOT\_AVAILABLE**, where **501** is the command sent to the pump.



**Figure 82 - Communicator Software - Selection of Flowtron Universal Command List**

## 6 Communication Error when Executing Commands

- 6.1 If there is no immediate response from the pump when you send a command, then it means that there could have been a communication error between the PC and the pump:
  - 6.1.1 The **Send** button is “greyed out”
  - 6.1.2 There will be no response in the **Receive** box.
  - 6.1.3 If you look in the **Tx Rx** box, you will see 10 attempts to send the command to the pump. After 10 failed attempts, a **Communication Error** dialog box is displayed (refer to Figure 80).
  - 6.1.4 Check that the pump is powered up and in **Standby**.
  - 6.1.5 Check the connections between the PC, Serial Communications Pack and the pump.
  - 6.1.6 Select the other **COM** port on the PC, as follows:
    - 6.1.6.1 Click **Connection**, then click **Exit** on the drop-down menu.
    - 6.1.6.2 The application startup dialog box is then displayed (refer to Figure 76).
    - 6.1.6.3 Select another **COM** port on the PC (refer to Page 9, Section 3).
    - 6.1.6.4 Click the **Serial Communicator** button to restart the program.

Re-send the command to the pump.

## 7 Closing the Communicator Software

- 7.1 To close the Communicator software, do the following:
  - 7.1.1 Click **Connection**, then click **Exit** on the drop-down menu.
  - 7.1.2 The application startup dialog box is then displayed (refer to Figure 76).
  - 7.1.3 Click **Exit**.
  - 7.1.4 The Communicator software is closed.
- 7.2 If you try to close the Communicator software by selecting and closing the application startup dialog box directly, you will be prevented from doing it (refer to Figure 83). You must carry out the procedure detailed in Para 7.1, above.

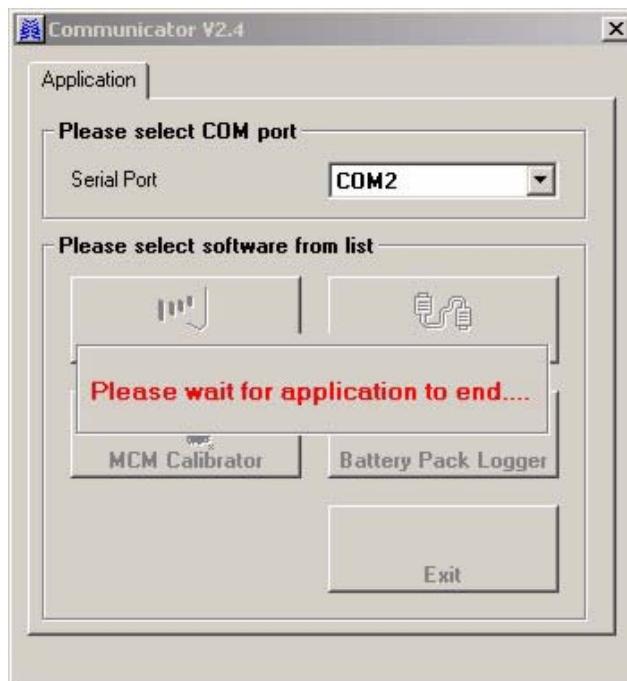


Figure 83 - Communicator Software - Closing the Software

**Table 31 - Power-Up Self-Test Sequence**

<b>Step</b>	<b>Elapsed Time (approx.)</b>	<b>Duration (approx.)</b>	<b>Sounder</b>	<b>LCD Screen</b>
1 (Start)	0 sec	23 sec	Silent	 Huntleigh Healthcare
2 (Software Version)	23 sec	7 sec	Double "beep"	PLEASE WAIT running diagnostic Universal Rev: 3.00
3 (End)	30 sec	Waiting to start treatment	Silent	Standby Attach garments  Options

## 8 Initialising the Pump

- 8.1 Connect the pump to a PC using the Serial Communications Pack (refer to Chapter 6 “Updating the software”, Page 9, “Connecting the Pump to a Laptop / Desktop PC”).
- 8.2 Run the Communicator software on the PC (refer to Chapter 6 “Updating the software”, Page 11, “Launching the Communicator Software”).
- 8.3 Connect the pump to a suitable mains/power supply.
- 8.4 The pump will perform a power-up self-test sequence, as detailed in Table 31.
- 8.5 When the power-up self-test sequence is complete and before upgrading the pump software, make sure that the PC can communicate correctly with the pump, as follows (refer to Chapter 6 “Updating the software”, Page 12, “Executing Commands on the Command Menu”):
  - 8.5.1 The pump must be left in Standby.
  - 8.5.2 Scroll through the menu of **Flowtron Universal Commands** on the Communicator software on the PC, to the section heading **VERSIONS**.
  - 8.5.3 Send the command **801 - Read\_Software\_Version** to the pump.
  - 8.5.4 Check that the command is successful. **801 = X.XX** should appear in the **Receive** part of the dialog box, where **X.XX** is the software version currently loaded on the pump.
  - 8.5.5 If the command is unsuccessful, then carry out the procedure detailed in Chapter 6 “Updating the software”, Page 13, “Communication Error when Executing Commands”.

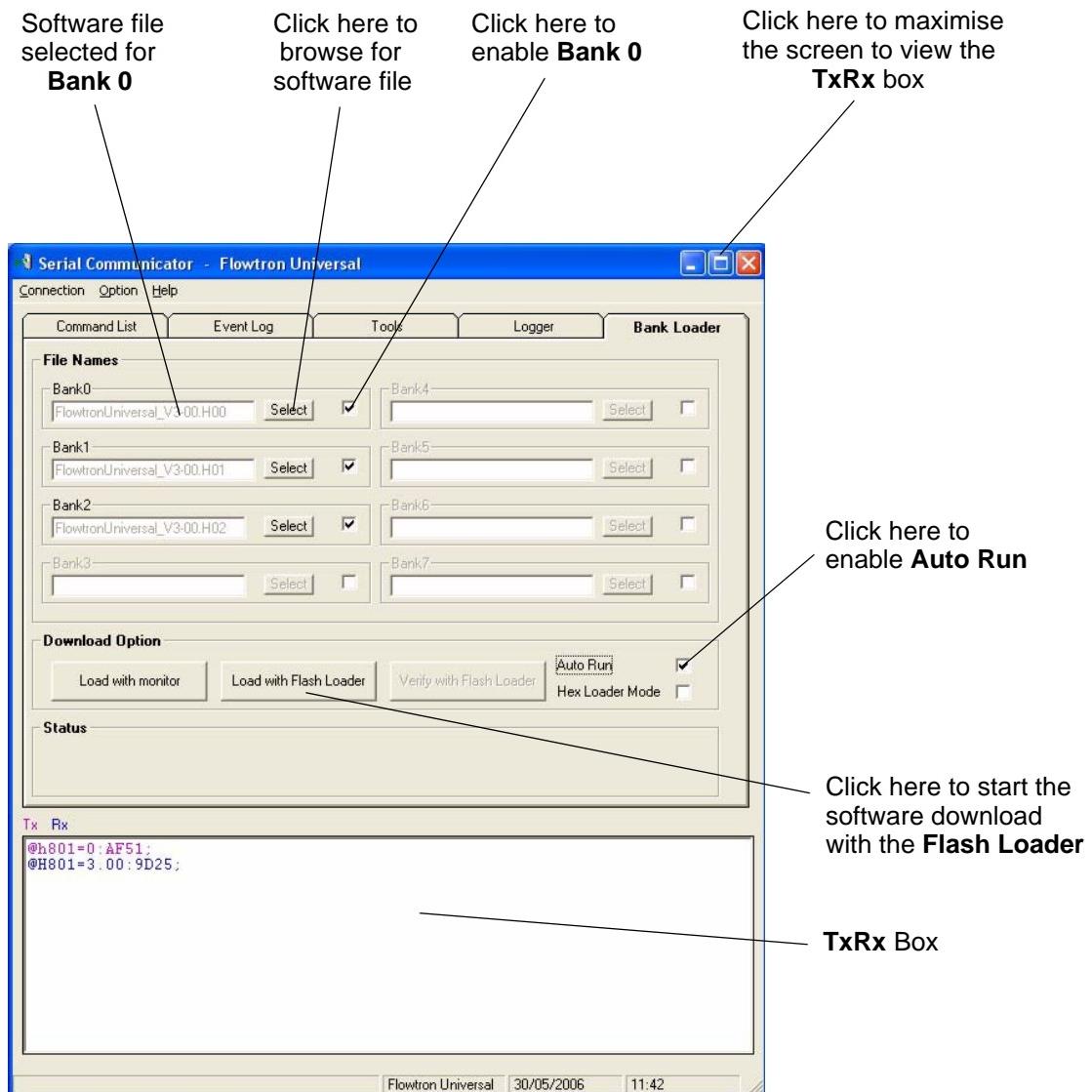


Figure 84 - Communicator Software - Initialising the Bank Loader



Figure 85 - Pump LCD Screen - Standby

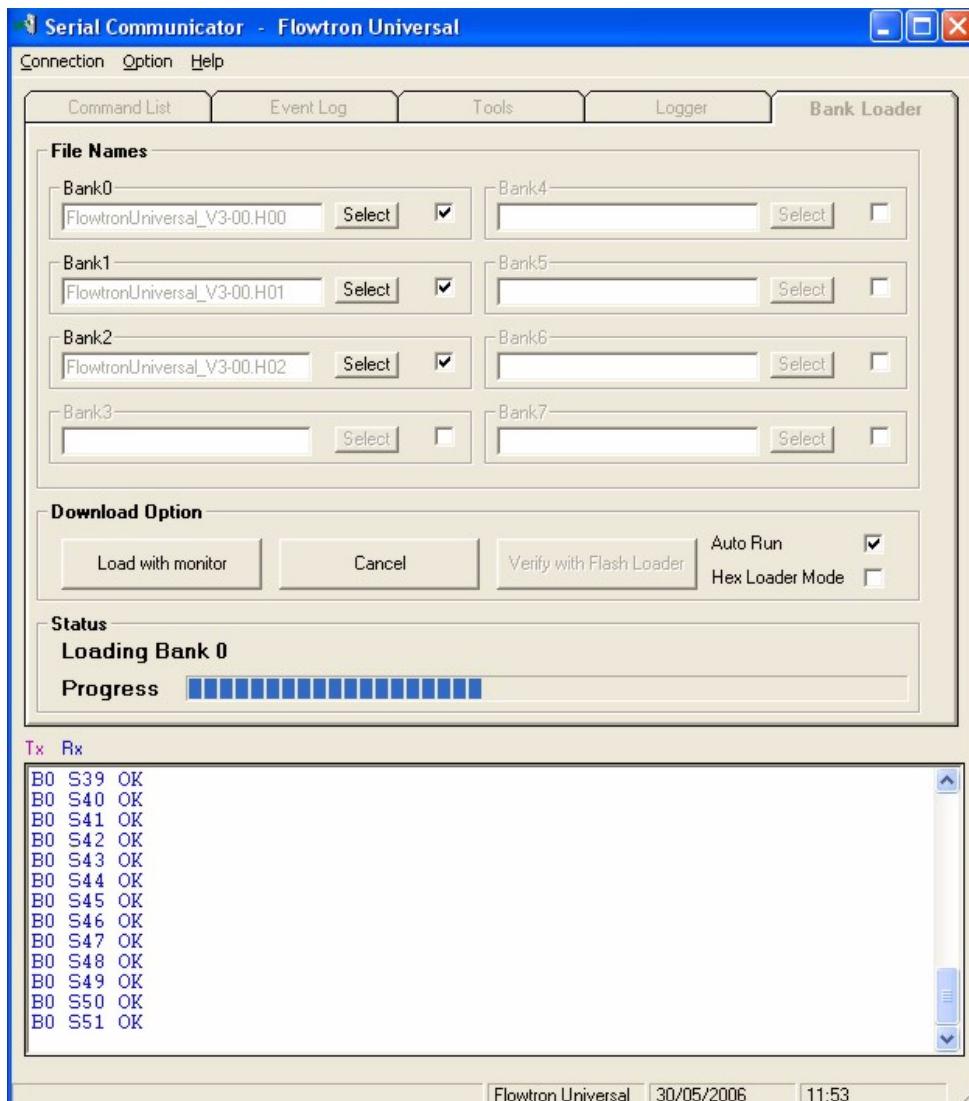
## 9 Checking the Version of the Pump Software

- 9.1 Look at the LCD screen, and make sure the pump is in Standby (refer to Figure 85).
- 9.2 On the Communicator software, click on the **Command List** tab (refer to Figure 84).
- 9.3 Scroll through the menu of **Flowtron Universal Commands** on the Communicator software to the section heading **VERSIONS**.
- 9.4 Send the command **801 - Read\_Software\_Version** to the pump.
- 9.5 Check the **Receive** part of the dialog box:
  - 9.5.1 There should be **801 = 3.01** in the **Receive** part of the dialog box, where **3.01** is the correct version of the software downloaded to the pump. ***This is the end of the software upgrade.*** Continue the test at Para 9.6 below.
  - 9.5.2 If the command is unsuccessful or the software version is **NOT 3.01**, then:
    - 9.5.2.1 The software upgrade has failed and the procedure must be repeated.
    - 9.5.2.2 The pump is faulty and must be rejected.
- 9.6 Disconnect the pump from the mains/power supply.
- 9.7 Remove the Serial Communications Pack from the pump (refer to Chapter 6 “Updating the software”, Page 9, “Connecting the Pump to a Laptop / Desktop PC”).

## 10 Downloading the V3.01 Software Files to the Pump

- 10.1 Load the **V3.01 Flowtron Universal** pump software onto the PC, as follows:
  - 10.1.1 The software for the **Flowtron Universal** pump is contained in the following three files which must be downloaded to the pump using the Communicator software:
    - FlowtronUniversal\_V3-01.H00
    - FlowtronUniversal\_V3-01.H01
    - FlowtronUniversal\_V3-01.H02
  - 10.1.2 These three software files will normally be supplied on either of the following media:
    - CD ROM.
    - File attachments on an email.
  - 10.1.3 If the three software files are supplied on a CD ROM, load the CD ROM onto the PC.
  - 10.1.4 If the three software files are supplied as attachments on an email, do the following:
    - 10.1.4.1 Open the email.
    - 10.1.4.2 Click on **File**, followed by **Save Attachments**.
    - 10.1.4.3 Make sure all three files are selected, and click **OK**.
    - 10.1.4.4 Browse in the **Save Attachment** dialog box for a suitable location to save the two files, and click **Save**.
- 10.2 Initialise the pump (refer to Page 15, Section 8).
- 10.3 Look at the LCD screen, and make sure the pump is in Standby (refer to Figure 85).
- 10.4 On the Communicator software, click on the **Bank Loader** tab (refer to Figure 84).
- 10.5 Click the middle button at the top right of the dialog box to maximise the screen to view the **Tx Rx** box at the bottom of the dialog box.  
**Note:** *At this stage, ignore any text in the Tx Rx box.*
- 10.6 On the left side of the dialog box, under **File Names**, select the three pump software files, as follows (refer to Figure 84):
  - 10.6.1 Click in the boxes on the right of **Bank 0**, **Bank 1** and **Bank 2** to enable them. The text will become visible and there will be a tick () in each box.

- 10.6.2 Make sure that **Bank 3 to Bank 7** are not enabled. The text will be “greyed-out” and the boxes on the right of **Bank 3 to Bank 7** will be blank.
- 10.6.3 Select the **FlowtronUniversal\_V3-01.H00** software file for **Bank 0**, as follows:
- 10.6.3.1 Click the **Select** button on **Bank 0**. The **Browsing for Files** dialog box will open.
  - 10.6.3.2 Search for the three pump software files on the CD ROM or the PC (refer to Para 10.1).
  - 10.6.3.3 Select **FlowtronUniversal\_V3-01.H00** and click **Open**.
  - 10.6.3.4 The **Bank Loader** tab will reappear with **FlowtronUniversal\_V3-01.H00** in the **Bank 0 File Name** box.
- 10.6.4 Repeat the procedure in Para 10.6.3 to select the **FlowtronUniversal\_V3-01.H01** software file for **Bank 1**.
- 10.6.5 Repeat the procedure in Para 10.6.3 to select the **FlowtronUniversal\_V3-01.H02** software file for **Bank 2**.
- 10.7 On the dialog box, under **Download Option**, click the box to the right of **Auto Run** to enable it. There will be a tick (✓) in the box.



**Figure 86 - Communicator Software - Downloading the Software**



**Figure 87 - Communicator Software - Flash Loader Fail**

- 10.8 On the dialog box, under Download Option, click Load with Flash Loader to start the software download of the V3.01 Flowtron Universal software to the pump.
  - 10.8.1 If the **Flash Loader Fail** dialog box (refer to Figure 87) is displayed when you click **Load with Flash Loader**, click **OK**:
    - 10.8.1.1 The software download should start. If so, continue the procedure at Para 10.9, below.  
**Note:** *It is normal for the **Flash Loader Fail** dialog box to be displayed the first time you click **Load with Flash Loader**.*
    - 10.8.1.2 If the **Flash Loader Fail** dialog box continues to be displayed every time you click **Load with Flash Loader**, then carry out the procedure detailed in Chapter 6 “Updating the software”, Page 13, “Communication Error when Executing Commands”.
- 10.9 As the software is downloaded, the progress is shown in the dialog box, as follows (refer to Figure 86):
  - The **Status** part of the dialog box shows **Loading Bank 0** (followed by **Loading Bank 1** and then **Loading Bank 2**) and a moving **Progress** “status bar”.
  - The **Tx Rx** box counts up from **B0 S0 OK** to **B0 S128 OK** (followed by **B1 S0 OK** to **B1 S128 OK** and then **B2 S0 OK** to **B2 S128 OK**).
- 10.10 The software download is complete when:
  - The **Status** part of the dialog box is empty (when the **Loading Bank 2** and the moving **Progress** “status bar” have been removed).
  - The count in the **Tx Rx** box gets to **B2 S128 OK**.
- 10.11 At the end of the download, the pump will automatically start a self-test sequence, as detailed in Page 14, Table 31:
  - 10.11.1 If the self-test sequence is successful, check the version of the software on the pump to make sure the software has been downloaded correctly (refer to Page 19, Section 10.11.2).
  - 10.11.2 If the pump fails the self-test sequence, the pump is faulty and must be rejected.



## CHAPTER 7

### TECHNICAL SPECIFICATION

<b>PUMP</b>																													
Model:	Flowtron Universal																												
Part Numbers:	<table style="width: 100%; border-collapse: collapse;"> <tr><td>507001</td><td>UK/KSA</td></tr> <tr><td>507003</td><td>USA/Canada</td></tr> <tr><td>507004DE</td><td>Germany</td></tr> <tr><td>507004DK</td><td>Denmark/Sweden</td></tr> <tr><td>507004ES</td><td>Spain</td></tr> <tr><td>507004FR</td><td>France</td></tr> <tr><td>507004IT</td><td>Italy</td></tr> <tr><td>507004NL</td><td>Dutch/Belgium</td></tr> <tr><td>507009AU</td><td>Australia/NZ</td></tr> <tr><td>507009CN</td><td>China</td></tr> <tr><td>507009JP</td><td>Japan</td></tr> <tr><td>507009ZA</td><td>South Africa/India</td></tr> <tr><td>507EUR</td><td>Europe</td></tr> <tr><td>507UNI</td><td>Universal</td></tr> </table>	507001	UK/KSA	507003	USA/Canada	507004DE	Germany	507004DK	Denmark/Sweden	507004ES	Spain	507004FR	France	507004IT	Italy	507004NL	Dutch/Belgium	507009AU	Australia/NZ	507009CN	China	507009JP	Japan	507009ZA	South Africa/India	507EUR	Europe	507UNI	Universal
507001	UK/KSA																												
507003	USA/Canada																												
507004DE	Germany																												
507004DK	Denmark/Sweden																												
507004ES	Spain																												
507004FR	France																												
507004IT	Italy																												
507004NL	Dutch/Belgium																												
507009AU	Australia/NZ																												
507009CN	China																												
507009JP	Japan																												
507009ZA	South Africa/India																												
507EUR	Europe																												
507UNI	Universal																												
Pressure Range:	40 ± 5 mmHg Calf 130 ± 5 mmHg Foot																												
Supply Voltage:	100 - 230 VAC																												
Supply Frequency:	50 - 60Hz																												
Power Input:	120 VA																												
Size:	254 x 267 x 152 mm (10.0 x 10.5 x 6.0")																												
Weight:	3.9 kg (8.5 lb)																												
Case Material:	ABS Plastic																												
Plug Fuse Rating:	5A to BS1362 (UK ONLY)																												
Fuse:	2 x T3.15AL 250 V																												
Degree of protection against electric shock:	Mains Connected - Class II with a Functional Earth Type BF Mains Not Connected - Internally Powered																												
Degree of protection against liquid ingress:	IPX0																												
Mode of operation:	Continuous																												

<b>SYMBOLS</b>							
	Standby. Note: Unit is not isolated from mains supply.		Do not dispose of in the domestic refuse		Alternating Current		Double Insulated
	Run		Refer to accompanying documents		Direct Current		Refer to the User Manual
	Dangerous voltage		Type BF	<b>SN:</b>	Serial Number	<b>Ref:</b>	Model Number
	With respect to electric shock, fire and mechanical hazards only in accordance with UL60601-1 and CAN/CSA C22.2 No. 601.1. MEDICAL EQUIPMENT		Fuse				

<b>ENVIRONMENTAL INFORMATION</b>			
<b>Condition</b>	<b>Temperature Range</b>	<b>Relative Humidity</b>	<b>Atmospheric Pressure</b>
<i>Operating (Pump &amp; Battery Pack)</i>	+10°C to +40°C	30% to 75%	700hPa to 1060 hPa
<i>Storage and Transport (Pump)</i>	-40°C to +70°C	10% to 95% (non-condensing)	500 hPa to 1060 hPa
<i>Storage and Transport (Battery Pack)</i>	-10°C to +30°C	30% to 75%	500 hPa to 1060 hPa

<b>ACCESSORIES</b>	
Part:	Battery Pack
Part Number:	BBP600
Size:	242 x 37 x 118 mm
Weight:	0.8 kg
Electrical Rating:	13.8V DC —— 4Ah (NiMh)
Symbols	
	Do not dispose of in domestic refuse
	Recycle

## CHAPTER 8

### PARTS LIST

#### **1 General**

On the left side of the **Description** column in the main parts list, the inclusion of none, one or two leading "bullets" is used to indicate the different levels of assembly and sub-assembly, as detailed below.

<b>Symbol</b>	<b>Assembly Level</b>	<b>Example</b>
(Blank)	Level 1 or Top Assembly	Front Case, Printed Flowtron Universal
• (Single Bullet)	Level 2 or Sub-Assembly	Power Supply PCB Assembly
• • (Double Bullet)	Level 3 or Sub-Sub-Assembly	Fuse, 3.15A 20mm Type T

#### **2 Pump Parts List**

<b>Part Number</b>	<b>Description</b>	<b>Fig - Item</b>	<b>Qty</b>
<b>Pump General Assembly</b>			
507001 (previously AC600/UK)	Flowtron Universal Pump, UK/KSA	-	1
507003 (previously AC600/US)	Flowtron Universal Pump, USA/Canada		
507004DE (previously AC600/DE)	Flowtron Universal Pump, Germany		
507004DK (previously AC600/DK)	Flowtron Universal Pump, Denmark/Sweden		
507004ES (previously AC600/ES)	Flowtron Universal Pump, Spain		
507004FR (previously AC600/FR)	Flowtron Universal Pump, France		
507004IT (previously AC600/IT)	Flowtron Universal Pump, Italy		
507004NL (previously AC600/NL)	Flowtron Universal Pump, Dutch/Belgium		
507009AU (previously AC600/AU)	Flowtron Universal Pump, Australia/NZ		
507009CN (previously AC600/CN)	Flowtron Universal Pump, China		
507009JP (previously AC600/JP)	Flowtron Universal Pump, Japan		
507009ZA (previously AC600/ZA)	Flowtron Universal Pump, South Africa/India		
507EUR	Flowtron Universal Pump, refer to Table 9 .		

<b>Part Number</b>	<b>Description</b>	<b>Fig - Item</b>	<b>Qty</b>
507UNI	Flowtron Universal Pump, refer to Table 9 .		
<b><i>Top Case Assembly</i></b>			
507421	Top Case Assy, with Window & Membrane Label, Spares Item	39-30 40-20 43-30 48-20	1
507061	• Control PCB Assembly, Spares Item	43-20 48-10 57-30	1
507131	• Control PCB Assembly, New Item	43-20 48-10 57-30	1
507420	• • Motor and Manifold Assembly, Spares Item	43-10	1
151457	• • Rechargeable Battery, Spares Item	57-10	1
BP196	• • Cable Tie	57-20	1
631073	• • Tube, 100mm long (Compressor - Motor & Manifold Assy)	40-40 58-50	1
FAS223	• • Screw, 3 dia x 10 Pan Head	43-40 48-30	8
507305	• Run Button	48-50	1
507411	• Button Return Spring	48-60	1
507306	• Case Style Gasket	40-30	1
<b><i>Front Case Assembly</i></b>			
507396	Front Case, Printed Flowtron Universal	39-20 40-10 63-10	1
507058	• Power Supply PCB Assembly, Spares Item	58-40 50-10	1
507137	• Power Supply PCB Assembly, New item	58-40 50-10	1
507422	• • Fuse, 3.15A 20mm Type T, Spares Item	42-10	2
507410	• • Connector Sealing Strip	50-30 63-50	2
BP027	• • Compressor Support Rubber	50-40	2
FAS223	• • Screw, 3 dia x 10 Pan Head	50-20	6
509051	• Compressor Assembly, Series 6, 5.5V 50/60Hz	58-10 59-10	1
509317	• • Air Inlet Filter, Compressor Assembly	42-20	1
509320	• • Air Inlet Filter Holder	42-30	1

<b>Part Number</b>	<b>Description</b>	<b>Fig - Item</b>	<b>Qty</b>
507316	• • Compressor Mounting Bracket	58-20 59-20	1
507380	• • Compressor Bracket Grommet	59-30	2
507317	• • Compressor Bump Stop	59-40	2
509307	• • Anti-vibration (AV) Mount, Series 6	59-60	4
FAS218	• • Screw, 4mm dia x 12 Pan Head	58-30	2
FAS223	• • Screw, 3 dia x 10 Pan Head	59-50	2
BP027	• Compressor Support Rubber	63-20	2
BP042	• Ferrite Magnet	63-30	1
507386	• Magnet Mounting Pad	63-40	1

***Rear Case Assembly***

507302	Rear Case	39-10 62-10	1
507419	• Handle and Hook Assembly, Spares Item	39-50	1
	• Mains/Power IEC Cordset	33-10	1
507374	• Inlet Filter Felt	33-20	1
507315	• Case IEC Cover	33-30	1
BP027	• Compressor Support Rubber	62-20	2
507413	• Rubber Foot	33-50	10
FAS223	• Screw, 3 dia x 10 Pan Head	39-40	4
FAS045	• Screw, M3 x 10mm Pan Head	33-40	2

***Hose Set Assemblies***

507500	Hose Set Assembly, Standard	34-10	2
507501	Hose Set Assembly, (13 ft long)		A/R
507502	Hose Set Assembly Installation Kit (Consists of 2 x 507501)		A/R
FAS045	• Screw, M3 x 10mm Pan Head	34-20	2

***Pump Label Sets***

LAB339	Pump Product Label	32-20	1
--------	--------------------	-------	---



## CHAPTER 9

### SERVICE CONTACT DETAILS

**AUSTRALIA**

ArjoHuntleigh Pty Ltd  
PO Box 330  
Hamilton Hill  
Western Australia 6963  
T: +61 8 9 337 4111  
F: +61 8 9 337 9077

**AUSTRIA**

ArjoHuntleigh GmbH  
Dörrstrasse 85  
AT-6020 INNSBRUCK  
T: +43 512 20 4160-0  
F: +43 512 20 4160 75

**BELGIUM**

ArjoHuntleigh NV/SA  
Evenbroekveld 16  
B-9420 ERPE MERE  
T: +32 (0) 53 60 73 80  
F: +32 (0) 53 60 73 81

**DENMARK**

Huntleigh Healthcare A/S  
Vassingerødvej 52  
DK-3540 LYNGE  
T: +45 4 913 8486  
F: +45 4 913 8487

**FINLAND**

ArjoHuntleigh OY  
Vanha Porvoontie 229  
FI-01380 VANTAA  
T: +35 8 9 4730 4320  
F: +35 8 9 4730 4999

**FRANCE**

HNE Médical SA  
451 Chemin de Champivost  
BP20, 69579 Limonest Cedex  
T: +33 (0)4 78 66 62 66  
F: +33 (0)4 78 66 62 67

**GERMANY**

ArjoHuntleigh GmbH  
Peter-Sander-Strasse 10  
DE-55252 MAINZ-KASTEL  
T: +49 6134 1860  
F: +49 3167 186 160

**ITALY**

ArjoHuntleigh S.p.A.  
Via Tor Vergata, 432  
IT-ROMA 00133  
T: +39 06-87426214  
F: +39 06-87426222

**NETHERLANDS**

ArjoHuntleigh BV  
Biezenwei 21, 4004 MB TIEL  
Postbus 6116, 4000 HC Tiel  
Tel: +31 (0) 344 64 08 00  
Fax: +31 (0) 344 64 08 85

**NEW ZEALAND**

Huntleigh Healthcare Ltd  
Unit 6/38 Eaglehurst Road  
Ellerslie, Auckland,  
New Zealand  
T: +64 9 525 2488  
F: +64 9 525 2433

**POLAND**

ArjoHuntleigh Polska Sp. z.o.o.  
ul. Ks. Wawrzyniaka 2  
PL-62052 KOMORNIKI  
T: +48 61 662 1550  
F: +48 61 662 1590

**SOUTH AFRICA**

Huntleigh Africa Pty Ltd  
Willem Cruywagen Avenue  
Stand 120, Klerksoord  
Pretoria, South Africa  
T: +27 12 542 4680  
F: +27 12 542 4982

**SPAIN**

ArjoHuntleigh Ibérica S.L.  
Carratera de Rubí, 88,  
1<sup>a</sup> planta-A1  
Sant Cugat del Valles  
ES-BARCELONA 08130  
T: +34 93 583 1120

**SWEDEN**

Huntleigh Healthcare AB  
Box 30012  
S-200 61 Limhamn  
T: +46 (0)40 36 03 50  
F: +46 (0)40 49 43 75

**SWITZERLAND**

ArjoHuntleigh AG  
Florenzstrasse 1D  
CH-BASEL 4023  
T: +41 (0) 61 337 97 77  
F: +41 (0) 61 311 97 42

**UNITED KINGDOM**

Huntleigh Healthcare Ltd  
310-312 Dallow Road, Luton  
Bedfordshire, LU1 1TD  
T: +44 (0)1582 413104  
F: +44 (0)1582 459100

**USA**

ArjoHuntleigh  
2349 W Lake Street- Suite 250  
Addison, IL 60101  
Tel: +1 630 307 2756  
Toll Free US: (800) 323 1245  
Fax: +1 630 307 6195

SER0009\_02: September 2009

# ARJOHUNTLEIGH

... with people in mind.

Therapy & Prevention Product Division  
ArjoHuntleigh, 310-312 Dallow Road, Luton,  
Bedfordshire, LU1 1TD, United Kingdom  
T: +44 (0)1582 413104 F: +44 (0)1582 459100  
W: [www.arjhuntleigh.com](http://www.arjhuntleigh.com)



93/42/EEC



943447